WavePost

Post Processing Software
User Manual

for the 3D-ACM Wave

January 2000

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FSI *FALMOUTH SCIENTIFIC, INC.*

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❏ If the total value of the items is in excess of $1,000, include the following shippers oath with the invoices. (This can be typed on the invoices or on a separate letterhead.)

> *I, _____, declare that the articles herein specified are the growth, produce, or manufacture of the United States; that they were exported from the United States from the Port of_____, on or about _____; that they are returned without having been advanced in value or improved in condition by any process of manufacture or any other means, that no drawback, bounty, or allowance has been paid or admitted thereof.*
>
> *Signed _____*

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❏ Consign all air freight shipments to Falmouth Scientific, Inc. in care of Air Sea Forwarders, 140 Eastern Avenue, Chelsea, MA 02150.

❏ If the items are the property of FSI, please insure for them for their full value.

❏ Route via Logan International Airport only as the final destination.

❏ Mail or Fax one copy each of the invoice, packing list, and airway bill to FSI upon shipment.

❏ Refer to the FSI issued RMA number on all documents and correspondence.

❏ Prepay the freight.

Preface

Congratulations on your purchase of an FSI precision oceanographic instrument. Founded in 1989, FSI has become an international leader in the development and manufacture of oceanographic instrumentation, including Conductivity/Depth/Temperature (CTD) profilers, acoustic current meters, high performance water samplers, and wave and tide instruments. FSI products provide the highest accuracy for your monitoring needs in environments ranging from estuarine to full ocean depth.

What's in This Manual

This user manual provides information pertaining to the installation and operation of WavePost, a software program that processes and displays current velocity and pressure data acquired from FSI's 3D-ACM Wave Acoustic Current Meter. The manual is divided into the following six sections:

Section 1: About WavePost describes the key features of WavePost, and provides a general overview of the WavePost compatible acquisition software, 3DACM97, and the 3D-ACM Wave Acoustic Current Meter.

Section 2: Installing and Starting WavePost provides installation and startup procedures for getting WavePost running on your computer, as well as procedures for exiting and uninstalling WavePost.

Section 3: Windows and Commands describes the WavePost Main window and how to access menus and choose commands.

Section 4: Opening, Viewing and Printing Data Files describes how to configure and open data files and how to view and print the parameter data in the files.

Section 5: Viewing and Printing the Graphics Displays   describes the seven graphics displays, and how to view, set up, arrange, and print the graphics displays.

Section 6: Auto Processing and Exporting Data describes how you can use WavePost to auto process the pressure and current velocity data to determine wave direction, wave frequency and wave height information and save the information to a data file, and how you can export parameter data along with calculated current speed and direction.

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System Configuration Requirements

The system configuration required for WavePost to operate properly includes the following:

- Microsoft Windows 95®, Windows 98® or Windows NT®

- A computer with an Intel 80486® or Pentium® processor

- Minimum 64 MB of RAM

- A VGA monitor with 800 x 600 resolution

- A CD-ROM drive

- A hard disk with 10 MB free space

Pull-Down Menus

Like most programs, WavePost uses pull-down menus, which are opened from the menu bar in the program's Main window by pointing to the item with the mouse pointer and clicking the left mouse button. When the menu is open, you can select an item from it in the same manner.

In many of the procedures presented in this manual, the ➤ symbol is used to represent a sequence of menu item selections. For example, "Choose File ➤ Open" means select File from the menu bar, and then choose Open from the File menu when it opens.

Notes and Cautions

Where applicable, notes and cautions are provided as follows:

Note: Recommendations or general information that is particular to the material being presented or a referral to another part of this manual or to another manual.

Caution: A reminder that you are in danger of losing or misinterpreting data.

WavePost Version Number

For information about WavePost, choose Help ➤ About. The About window opens, which provides important information about your version of WavePost:
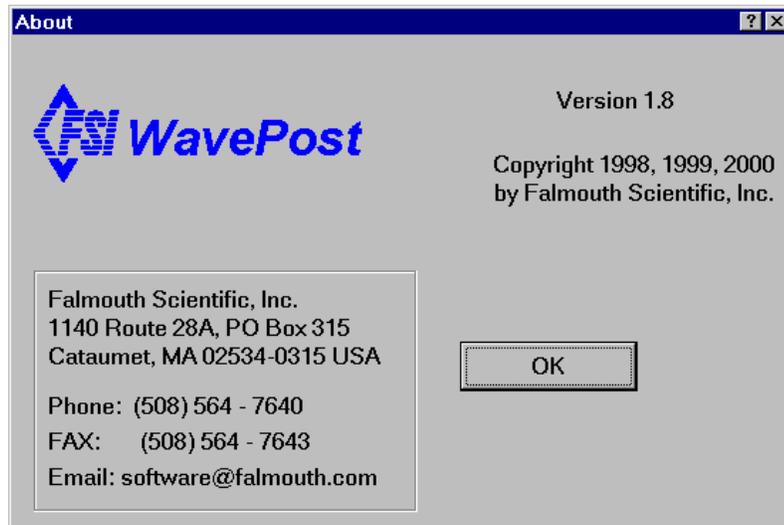
Customer Service

FSI welcomes your feedback. Therefore, please contact FSI customer service to offer any comments or suggestions or to request technical support.

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SECTION 1: About WavePost

T he WavePost post processing software provides a convenient, user friendly means of processing, viewing and printing parameter data that have been acquired from FSI's 3D-ACM Wave Acoustic Current Meter (ACM) instruments and saved to an ASCII data file. All the parameter data can be viewed in a data window, and the current velocity and pressure data and wave information can be viewed in graphics displays.

The 3D-ACM Wave collects, outputs and stores current velocity data, pressure data, 3-axis compass data, 2-axis tilt data, temperature data, and data from optional sensors, including a CTD. All the data stored in a 3D-ACM Wave can be retrieved and saved as an ASCII data file using 3DACM97, a software program available from FSI that is also used to configure and to acquire data in real time from a 3D-ACM Wave.

This section provides an overview of WavePost and its key features, along with a description of 3DACM97 and the 3D-ACM Wave.

WavePost Overview

WavePost runs on the Windows 95, the Windows 98 or the Windows NT platform. WavePost inputs and processes data files that have been created using 3DACM97. After processing, the data can be viewed in a data window or in graphics displays, and printed. Specifically, the major functions that WavePost allows you to perform are the following:

Input data by opening any number of data files containing parameter data acquired by a 3D-ACM Wave and saved using 3DACM97.

Choose to input either instantaneous or vector averaged current velocities by setting the appropriate data file configuration settings.

Choose the data file properties by setting the appropriate data file configurations settings, including whether to print a header when printing a graph; adjusting the true north correction; compensating for depth attenuation; selecting the number of samples to process when calculating wave height, frequency and direction; and applying temperature and atmospheric corrections to the pressure data.

View the data files in a view data window which allows you to view a selection of any four parameters in any of the open data files simultaneously, and to scroll through all of the scans.

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Print the data files from a view data window which allows you to print all the parameter data in any of the open data files.

View header information in any of the open data files.

View the graphics displays for any of the open data files, where the graphics displays comprise four current velocity graphics displays—Velocity Time Series, Speed and Direction, Progressive Vector, and Distribution; and three pressure graphics displays—Pressure Analysis, Wave Direction, and Wave Height and Direction.

Set up the graphics displays by selecting the colors of the plots and graph backgrounds, the full scale ranges and other setup parameters.

Change the default graphics display settings for any of the graphics displays setups.

Arrange any number of graphics display windows in the Main window, one for each open data file, and select any window for viewing the graphics displays, setting up the graphics displays, and printing the graphs.

Print preview the graphs in a print preview window for any of the open graphics display windows before printing.

Print the graphs for any of the open graphics display windows from the print preview window, or directly without previewing first.

Auto process the pressure and current velocity data to determine wave direction, wave frequency and wave height information for multiple data sets of pressure and current velocity data, and save the information to a file.

Export all the parameter data along with calculated current speed and direction, or just the current speed and direction, in comma delimited, tab delimited or Matlab format.

3DACM97 Configuration and Acquisition Software

WavePost inputs data that have been acquired in real time from a 3D-ACM Wave, or retrieved from the instrument's internal memory, and saved to a file in ASCII format. To acquire or retrieve the data, the 3DACM97 configuration and acquisition software is required and is included with the 3D-ACM Wave.

3DACM97 runs on the Windows 95, the Windows 98 or the Windows NT platform and primarily is used to check, to configure and to prepare the 3D-ACM Wave for deployment. In addition, 3DACM97 is used to acquire and display the data in real time, to retrieve data from the instrument's internal memory, to view the data, and to save the data for processing, displaying and printing by WavePost.

The 3D-ACM Wave Acoustic Current Meter

The 3D-ACM Wave Acoustic Current Meter measures current velocity in three dimensions and includes a precision micro-machined pressure sensor for measuring wave height, a 3-axis fluxgate compass for measuring the Earth's magnetic field, a 2-axis electrolytic tilt sensor for measuring tilt, and an a solid state temperature sensor for measuring water temperature. The 3D-ACM can also interface with an optional CTD and includes two DC input channels which interface with most DC output sensors, including dissolved oxygen, pH, chlorophyll, light transmission, and others. The 3D-ACM can be powered from an external DC power supply or from an internal alkaline battery pack. Data can be acquired in real time in ASCII format through an RS-232 or optional RS-485 serial interface at baud rates up to 19200 bits/sec, or the instrument can be deployed and the data stored in its standard internal 32 MB PCMCIA flash memory card for later retrieval. The 3D-ACM has a depth rating of 25 meters, and a tri-pod stand is available as an option.

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SECTION 2: Installing and Starting WavePost

This section describes how to install WavePost from the WavePost For Windows 95 CD-ROM. WavePost is installed using the FSI WavePost Setup program, which is started by choosing the Add/Remove Programs icon in the Windows Control Panel. In addition, this section describes how to start, exit, and uninstall WavePost.

Note: *Before installing WavePost, uninstall any previous version of the program if installed on your computer. (See "Uninstalling WavePost" on page 2-5 for instructions on how to uninstall WavePost.)*

Installing WavePost

To install WavePost:

1 ▶ Exit all programs and turn off any virus protection or screen saver software.

2 ▶ Insert the WavePost For Windows 95 CD-ROM into your CD-ROM drive.

3 ▶ Select Start ➤ Settings ➤ Control Panel to open the Control Panel.

4 ▶ Choose Add/Remove Programs in the Control Panel.

The Add/Remove Programs Properties dialog box opens:

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5 Click Install.

The Install Program From Floppy Disk or CD-ROM dialog box opens:
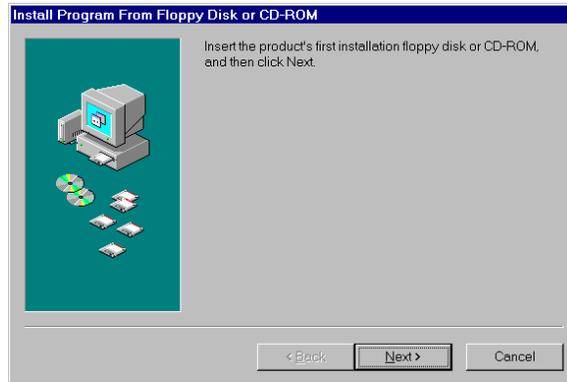
6 Click Next.

The Run Installation Program dialog box opens:
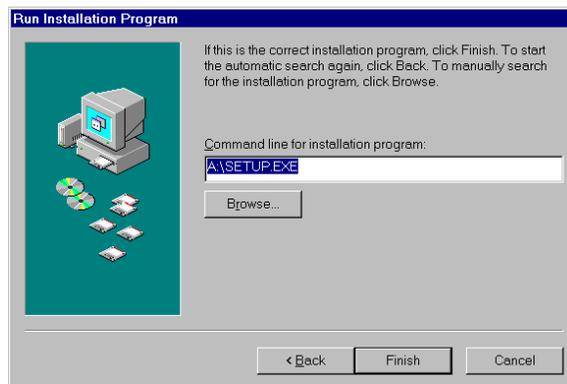
7 Click Finish.

After the InstallShield Wizard is prepared, the Welcome dialog box opens:
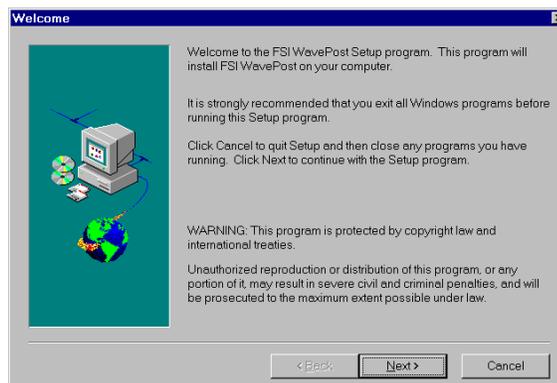
8 ▶ Click Next.

The Choose Destination Location dialog box opens:
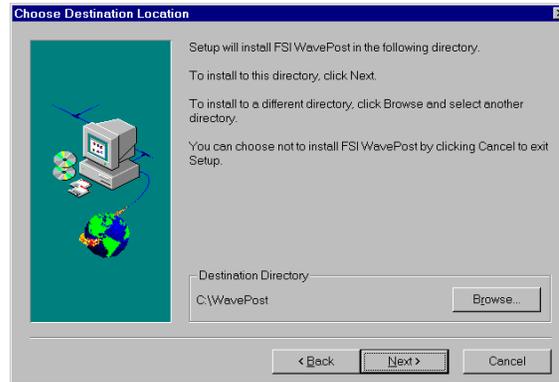
9 ▶ Click Next to accept the specified destination directory as the directory in which the WavePost program will be installed. Or instead, click Browse and follow the instructions to select a different directory, and then click Next.

The Select Program Folder dialog box opens:
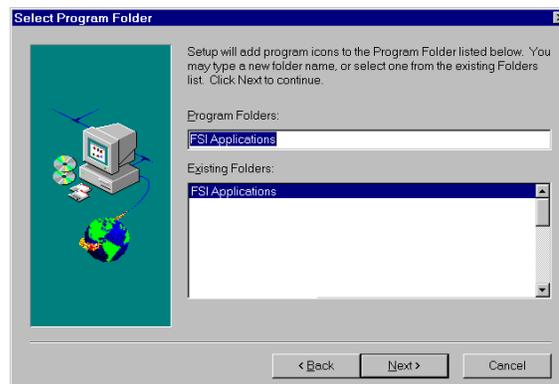
10 ▶ Click Next to accept FSI Applications as the name of the program folder in which the WavePost program icons will be added. Or instead, select an existing program folder from the list or type a new folder name, and then click Next.

The WavePost program files are copied to the specified destination directory, and then the Setup Complete dialog box opens.

11 ▶ Click Finish in the Setup Complete dialog box to exit from the FSI WavePost Setup program.

WavePost is installed and ready to be started.

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Starting WavePost

To start WavePost:

1▶   Select Start ➤ Programs ➤ FSI Applications.

The FSI Applications menu opens:

2▶   Choose WavePost.

WavePost starts and the WavePost Main window opens:
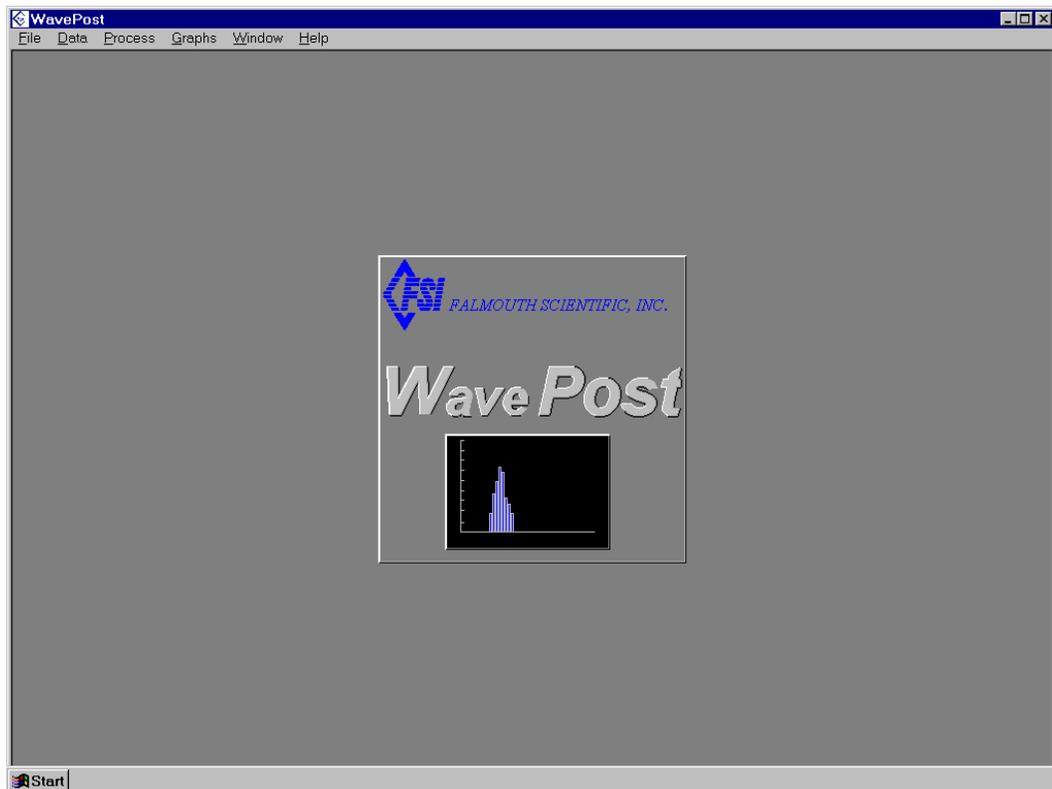
Exiting WavePost

To exit WavePost:

1 Select File from the menu bar in the Main window. (See "SECTION 3: Windows and Commands," for information on the Main window and how to access commands from the menu bar.)

The File menu opens.

2 Choose Exit.

Uninstalling WavePost

To uninstall WavePost:

1 Exit from WavePost.

2 Select Start ➤ Settings ➤ Control Panel to open the Control Panel.

3 Choose Add/Remove Programs in the Control Panel.

The Add/Remove Programs Properties dialog box opens:
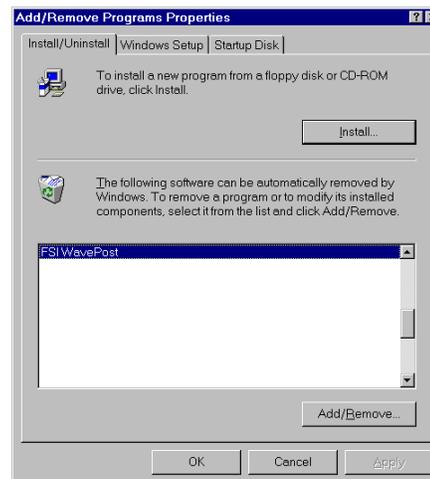
4 Select FSI WavePost and click Add/Remove.

5 Click Yes when asked to confirm that you want to remove the program and all of its components.

WavePost is removed from your computer.

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SECTION 3: Windows and Commands

All of WavePost's commands are accessed from the Main window, which opens after WavePost has completed its startup. (See "Starting WavePost" on page 2-4 for instructions on how to start WavePost.) This section provides a general description of the Main window and describes how to access menus and choose commands.

The Main Window

After WavePost has completed its startup, the Main window shown in Figure 3-1 opens. The Main window provides access to all of WavePost's commands
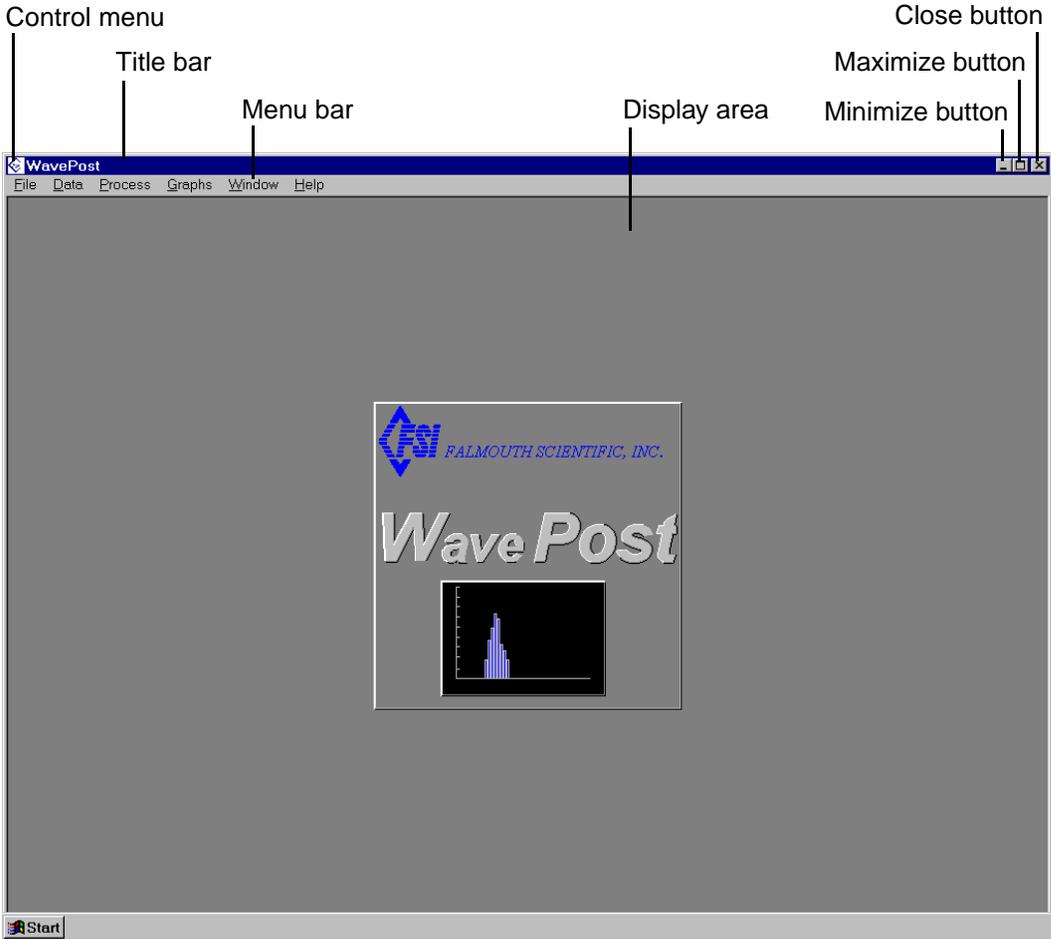
Figure 3-1: *The Main Window*

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through the menu bar. The Main window also contains standard Windows features, such as the Control menu, the Title bar, and the Maximize, Minimize, and Close buttons. The display area composes the rest of the Main window.

Menu Bar

The menu bar, which contains pull-down menus, provides access to all of the WavePost commands. To open a menu from the menu bar, place the mouse pointer on the menu name to select it and then click the left mouse button. The menu opens as shown in Figure 3-2, which shows the open File menu. To choose an item from the menu, place the mouse pointer on the item to select it and then click the left mouse button.

You can also use the shortcut method for selecting menu items. To do this, press **ALT** followed by the underlined letter of the item you want to select on the menu bar, and then the underlined letter of the item you want to select in the menu that opens.
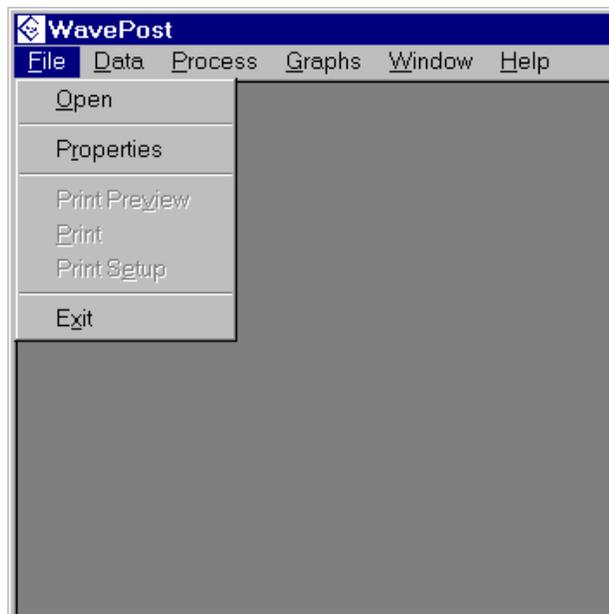
Figure 3-2: *The Open File Menu*

Display Area

The display area of the Main window is reserved for graphics display windows and dialog boxes. (See Figure 4-3 on page 4-5 for an example of graphics display windows in the display area.)

SECTION 4: Opening, Viewing and Printing Data Files

After using 3DACM97 to acquire data in real time from a 3D-ACM Wave, or to retrieve data from the instrument's internal memory, and save the data to an ASCII data file, the current velocity and pressure data, along with all the other parameter data in the data file, can be input to WavePost for viewing and printing. To input the data, the data file is opened in WavePost. This section describes how to configure and open data files, and how to view and print the parameter data in the files.

Once a data file is open, the current velocity and pressure data can also be viewed on graphics displays and the graphs printed. (See "SECTION 5: Viewing and Printing the Graphics Displays.")

> *Note:* *For information on how 3DACM97 is used to acquire data in real time from a 3D-ACM Wave, or to retrieve the data from the instrument's internal memory, and save the data to a file, refer to the "3DACM97 Configuration and Acquisition Software User Manual" provided with the 3D-ACM Wave.*

Verifying the Data File Configuration

Prior to opening data files containing current velocity and pressure data, it may be required to verify or change the file configuration settings. You need to do this only once, even when opening more than one data file, as long as the configuration requirements remain the same for all the files. Most of the settings, except where noted, can also be changed after the data file is opened.

To verify or change the data file configuration settings:

1 ➤ Choose File ➤ Properties.

The Properties dialog box shown in Figure 4-1 opens.

2 ➤ In the Velocity Data used in Calculations area of the Properties dialog box, select one of the following options:

- Average Velocities (AVN, AVE, AVU) to input only the *vector averaged* velocity data from the data file.

- Instantaneous Velocities (VN, VE, VU) to input only the *instantaneous* velocity data from the data file.
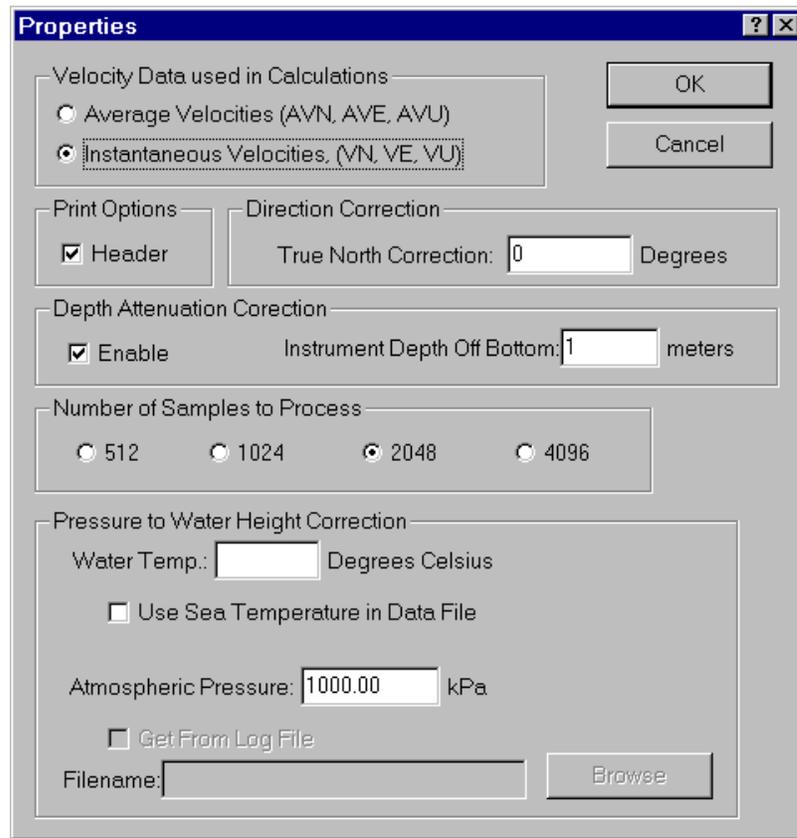
Figure 4-1: *The Properties Dialog Box*

Note: *The instantaneous current velocity and pressure data in the data file are either the instantaneous current velocity and pressure data recorded by the 3D-ACM Wave with the vector averaged current velocity data at the end of each averaging interval, or the selected burst current velocity and pressure data recorded during each Burst On Time. Which depends on whether average data or burst data, respectively, is chosen in 3DACM97 when retrieving and saving the data to the data file from the 3D-ACM Wave. In addition, if the data in the data file were acquired in real time with 3DACM97, the data are the selected burst current velocity and pressure data, which are acquired at a one second rate.*

Note: *This selection must always be made <u>before</u> opening the data file. Changing the selection after the file is open has no effect; the file must be reopened for the change to apply.*

3 ▶ In the Print Options area, select the Header check box if you want to print header information when printing a graph, or clear the check box if you want the graph to fill the page. (See "Printing the Graphs" on page 5-22 for instructions on how to print the graphs.)

4 ▶ If it is required to correct for magnetic field errors, enter a correction for true north in the True North Correction text box in the Direction Correction area. The entered value is subtracted from the current direction calculations.

Caution: *Unlike wind direction, which is defined as the direction from which the wind is blowing, current and wave direction is defined as the direction <u>toward</u> which the current is flowing. For example, a current direction of 180 degrees indicates that the current is flowing in the southerly direction—from north to south.*

5 ▶ In the Depth Attenuation Correction area, select the Enable check box if you want to enable depth correction, or clear the check box if you do not.

If you select Enable, enter the 3D-ACM Wave's height off the bottom in meters in the Instrument Depth Off Bottom text box.

6 ▶ In the Number of Samples to Process area, select the number of scans in a data set of pressure and current velocity data to process when determining information on wave height, wave frequency and wave direction. (See "Auto Processing to Determine Wave Information" on page 6-1 for information on how WavePost processes the pressure and current velocity data to determine wave information.)

7 ▶ In the Pressure to Water Height Correction area, enter the water temperature in °C in the Water Temp text box if you want to apply a constant temperature correction in the pressure to water height calculation.

8 ▶ Select the Use Sea Temperature in Data File check box if you want to use the temperature data from the data file for the temperature correction in the pressure to water height calculation, or clear the check box to use the temperature entered in the Water Temp text box, if any.

9 ▶ Enter the atmospheric pressure in kPa in the Atmospheric Pressure text box.

Opening Data Files

Data files containing current velocity and pressure data acquired from a 3D-ACM Wave should be opened only after the correct file configuration settings have been made in the Properties dialog box.

To open one or more data files:

1 Choose File ➤ Open.

The Open dialog box for ACM data files shown in Figure 4-2 opens. The example in the figure shows four data files: Wave1.dat, Wave2.dat, Wave3.dat, and Wave4.dat.

If the file you want to open is not visible, it may be in a different folder than the one shown. In this case, click the arrow in the Look in drop-down list box and select the folder in which the file is located.
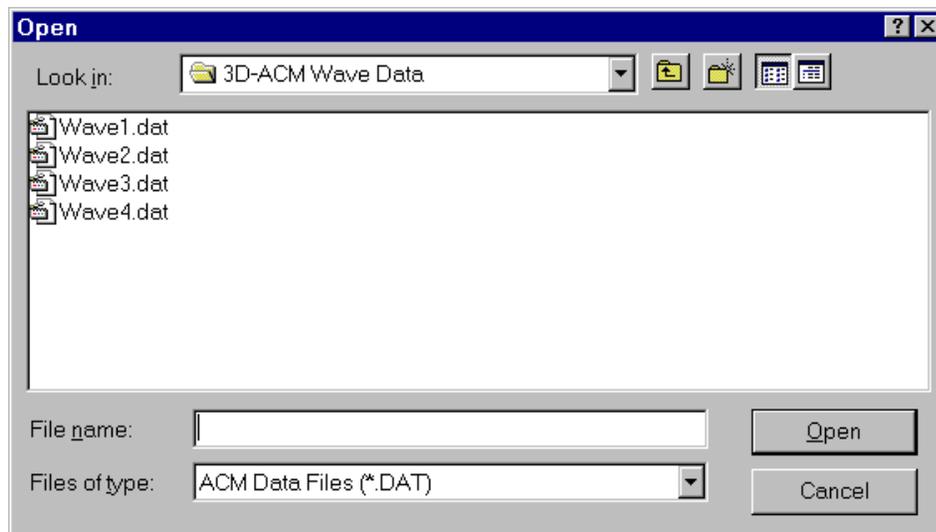
Figure 4-2: *The Open Dialog Box for ACM Data Files*

2 Click the file you want to open, and then click Open.

WavePost reads the data file, and the Velocity Time Series graphics display opens in a graphics display window with the current velocity data plotted. (For information on the Velocity Time Series graphics display and the other graphics displays, see "Viewing the Graphics Displays" on page 5-1.)

3 Repeat Step 1 and Step 2 for all the data files you want to open.

A graphics display window with the Velocity Time Series graphics display opens and is cascaded automatically for each of the data files, as shown in Figure 4-3, where three data files are open: Wave1.dat, Wave2.dat and Wave3.dat.
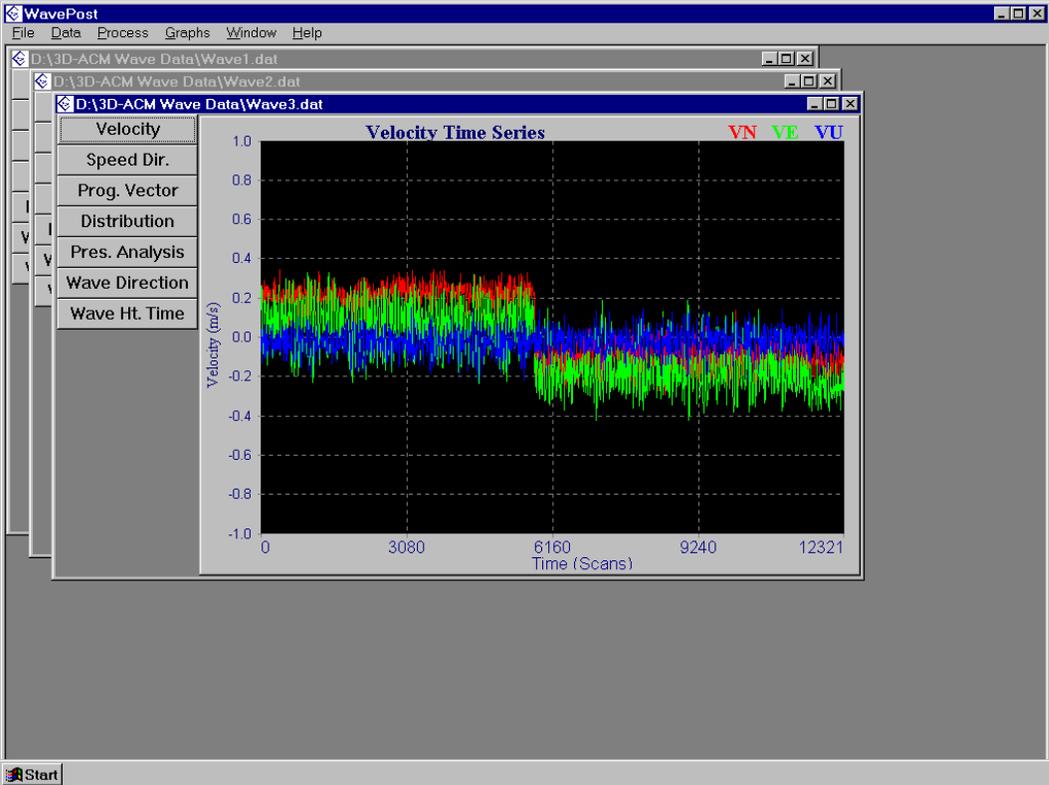
Figure 4-3: *Graphics Display Windows for Multiple Open Data Files*

4▸ To view any of the other graphics displays in a graphics display window, click the corresponding button in the upper left corner of the display.

To view a different graphics display window, click the window's title bar to make it the active window. The window moves to the front.

5▸ To close a graphics display window, and its data file, click the Cancel button.

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Viewing and Printing Data Files

The current velocity and pressure data and all the other parameter data retrieved from a 3D-ACM Wave by 3DACM97 and saved to a data file can be viewed and printed at any time after opening the file in WavePost. Any number of data files can be open at the same time.

> *Note:* *If you will be printing the data in a data file, set up the page first. To set up the page, choose File ➤ Print Setup and follow the instructions in the Page Setup dialog box that opens. Once the page is set up, it is not necessary to set it up again unless your page requirements change.*

The parameter data that can be viewed and printed when the data file contains *instantaneous* current velocity data and pressure data include the following:

SCANS:	Scan number
TIME:	Time in days
VN:	Instantaneous north current velocity in m/sec
VE:	Instantaneous east current velocity in m/sec
VU:	Instantaneous up current velocity in m/sec
SPRES:	Pressure in dBars

The parameter data that can be viewed and printed when the data file contains *vector averaged* current velocity data and pressure data include the following:

SCANS:	Scan number
TIME:	Time in days
AVN:	Vector averaged north current velocity in m/sec
AVE:	Vector averaged east current velocity in m/sec
AVU:	Vector averaged up current velocity in m/sec
SPRES:	Pressure in dBars

> *Note:* *All the other parameter data saved to the data file can also be viewed. For a complete list of the parameters, their definitions and units of measure, refer to the "3DACM97 Configuration and Acquisition Software User Manual" provided with the 3D-ACM Wave.*

To view and print the data in a data file:

1 ▶ Open one or more data files.

WavePost reads the data files, and a graphics display window with the Velocity Time Series graphics display opens and is cascaded automatically for each of the data files opened.

2 ▶ If more than one data file is open, click the title bar of the graphics display window corresponding to the data file for which you want to view the data.

The graphics display window is made active. If only one data file is open, the graphics display window for that data file will already be the active window.

3 ▶ Choose Data ▶ View Parameter Data.

The View Data window shown in Figure 4-4 opens.
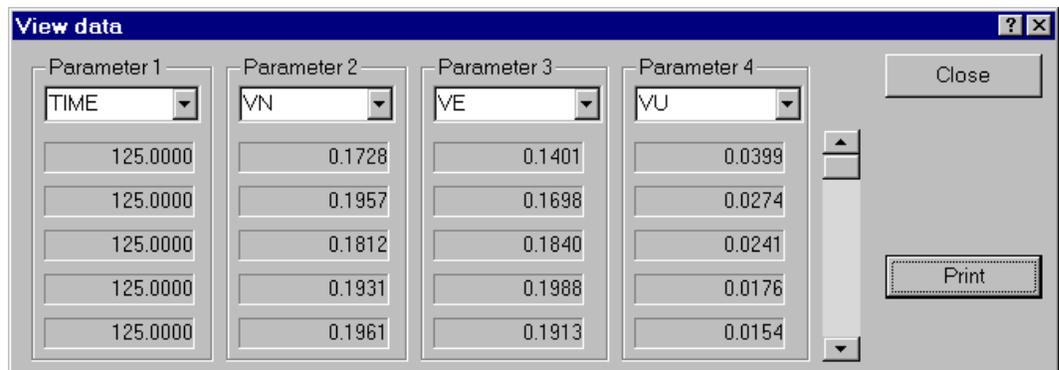
Figure 4-4: *The View Data Window*

4 ▶ In the Parameter 1 column of the View Data window, click the down arrow and select a parameter to display.

5 ▶ Repeat Step 4 for the Parameter 2, Parameter 3, and Parameter 4 columns.

6 ▶ Click the up or down arrow in the vertical scroll bar to scroll through the data one scan at a time. Or drag the scroll box up or down to quickly scroll through the data.

7 ▶ If you want to print the data, scroll to the first line of data you want to print, and then click Print. Or to close the View Data window, click Close.

If you click Print, the Number of Data Points dialog box opens:

Number of Data Points   ☒

Enter number of data points to print:

5775
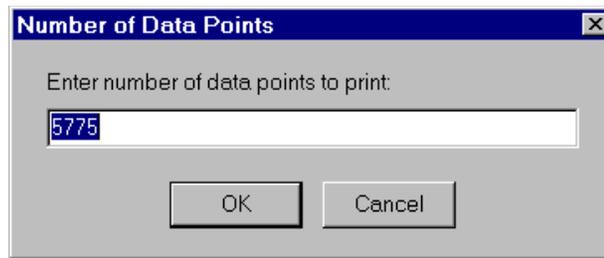
OK   Cancel

8▶ Enter the number of scans to print in the text box, and then click OK.

The Print dialog box opens.

9▶ Select your printer, and then click OK.

10▶ To close the View Data window, click Close.

11▶ To close the data file, click the Cancel button in the graphics display window for the data file.

Viewing Header Information in Data Files

The header information retrieved from a 3D-ACM Wave by 3DACM97 and saved to a data file can be viewed and printed at any time after opening the file in WavePost. Any number of data files can be open at the same time.

To view the header information in a data file:

1▶ Open one or more data files.

WavePost reads the data files, and a graphics display window with the Velocity Time Series graphics display opens and is cascaded automatically for each of the data files opened.

2▶ If more than one data file is open, click the title bar of the graphics display window corresponding to the data file for which you want to view the header information.

The graphics display window is made active. If only one data file is open, the graphics display window for that data file will already be the active window.

3▶ Choose Data ➤ View Header Information.

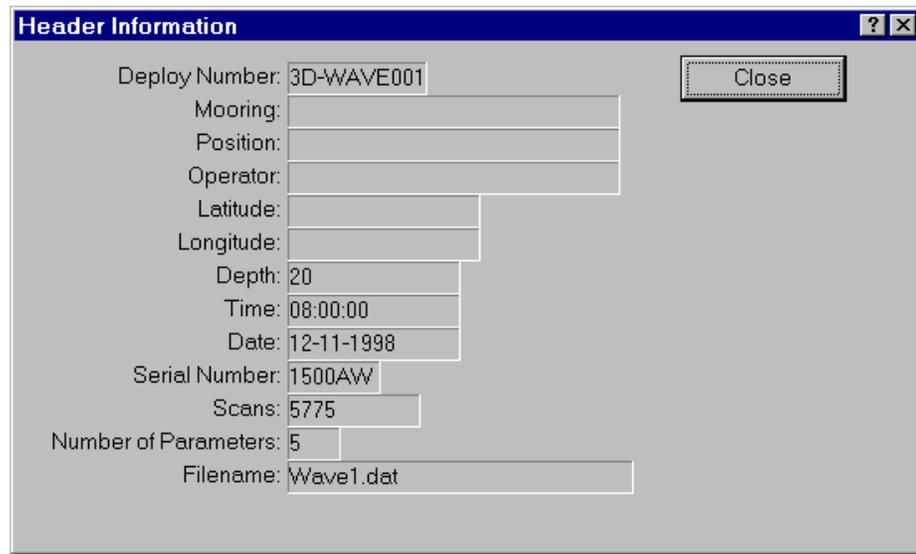The Header Information window shown in Figure 4-5 opens.

Figure 4-5: *The Header Information Window*

4 ▶ To close the Header Information window, click Close.

5 ▶ To close the data file, click the Cancel button in the graphics display window for the data file.

SECTION 5: Viewing and Printing the Graphics Displays

W**avePost** provides seven graphics displays, where four are specifically designed for viewing current velocity data—the Velocity Time Series, Speed and Direction, Progressive Vector, and Distribution graphics displays; and three are specifically designed for viewing pressure data—the Pressure Analysis, Wave Direction, and Wave Height and Direction graphics displays. The graph scales, the colors of the plots and graph backgrounds, and various other graphics display settings can be changed from the default or previous setup. This section describes the graphics displays, and how to view, set up, arrange, and print the graphics displays.

Viewing the Graphics Displays

The data displayed in the current velocity graphics displays—Velocity Time Series, Speed and Direction, Progressive Vector, and Distribution—depend on the selection in the Velocity Data used in Calculations area of the Properties dialog box. (See "Verifying the Data File Configuration" on page 4-1 for information on the Properties dialog box.) When Average Velocities (AVN, AVE, AVU) is selected before opening a data file, WavePost displays the *vector averaged* current velocities read from the data file in the current velocity graphics displays. When Instantaneous Velocities (VN, VE, VU) is selected before opening a data file, WavePost displays the *instantaneous* current velocities read from the data file. The data displayed in the pressure graphics displays—Pressure Analysis, Wave Direction, and Wave Height and Direction—are always based on instantaneous pressure data.

> *Note:* *The instantaneous current velocity and pressure data in the data file are either the instantaneous current velocity and pressure data recorded by the 3D-ACM Wave with the vector averaged current velocity data at the end of each averaging interval, or the selected burst current velocity and pressure data recorded during each Burst On Time. Which depends on whether average data or burst data, respectively, is chosen in 3DACM97 when retrieving and saving the data to the data file from the 3D-ACM Wave. In addition, if the data in the data file were acquired in real time with 3DACM97, the data are the selected burst current velocity and pressure data, which are acquired at a one second rate.*

To view any of the graphics displays, you must first open a data file as described in "Opening Data Files" on page 4-4. Any number of data files can be open at the same time. When a data file is opened, the Velocity Time Series graphics display opens by default.

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Viewing the Velocity Time Series Graphics Display

The Velocity Time Series graphics display, which is shown in Figure 5-1, displays plots of instantaneous or vector averaged north, east and up current velocities in m/sec verses time in Julian days or number of scans. When displaying instantaneous current velocities, VN, VE and VU are displayed in the upper right corner of the display; otherwise AVN, AVE, and AVU are displayed. Although the Velocity Time Series graphics display opens first by default when opening a data file, to view the display from any of the other graphics displays, click the Velocity button. For instructions on how to set up the Velocity Time Series graphics display, see "Setting up the Velocity Time Series Graphics Display" on page 5-11.
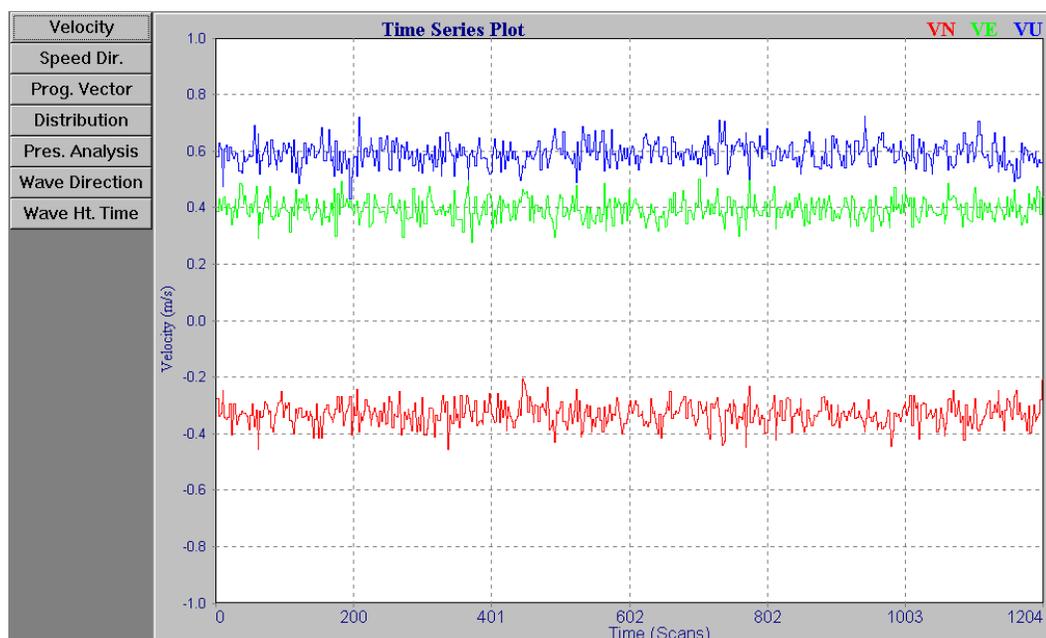
Figure 5-1: *The Velocity Time Series Graphics Display*

Viewing the Speed and Direction Graphics Display

The Speed and Direction graphics display, which is shown in Figure 5-2, provides a stick plot of current speed and direction, where the speed is calculated from the square root of the sum of the squares of the instantaneous or vector averaged horizontal current velocities and the direction is calculated from the arctangent. You can also choose to include the up velocities, along with the horizontal velocities, in the current speed calculations. The current speed in m/sec is represented as the length of a line—one line for each scan, and the direction as the orientation of each line—0° to 360° clockwise from straight up, where 0° is true north. To view the Speed and Direction graphics display, click the Speed Dir. button. For instructions on how to set up the Speed and Direction graphics display, see "Setting up the Speed and Direction Graphics Display" on page 5-13.

Figure 5-2: *The Speed and Direction Graphics Display*

Viewing the Progressive Vector Graphics Display

The Progressive Vector graphics display, which is shown in Figure 5-3, provides a vector plot of current speed and direction on a polar graph, where the speed is calculated from the square root of the sum of the squares of the instantaneous or vector averaged horizontal current velocities and the direction is calculated from the arctangent. You can also choose to include the up velocities, along with the horizontal velocities, in the current speed calculations. The current speed in m/sec is represented as the length of a line—one line for each scan, and the direction as the orientation of each line, where 0° is true north. To view the Progressive Vector graphics display, click the Prog. Vector button. For instructions on how to set up the Progressive Vector graphics display, see "Setting up the Progressive Vector Graphics Display" on page 5-14.
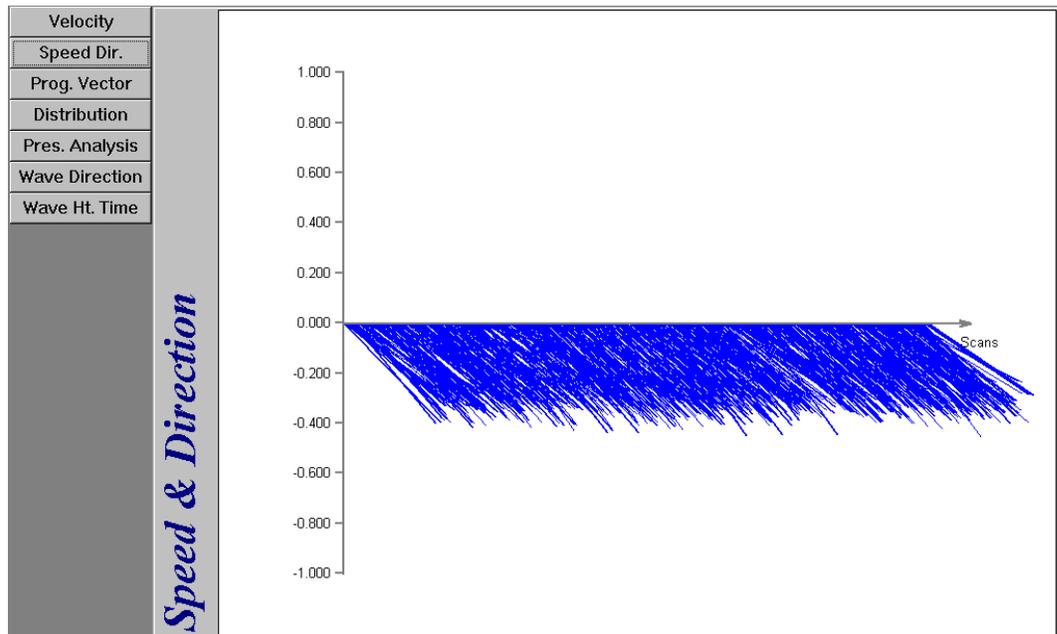
Viewing the Distribution Graphics Display

The Distribution graphics display provides a histogram of the current speed or the current direction or both verses number of scans. The current speed in m/sec is calculated from the square root of the sum of the squares of the instantaneous or vector averaged horizontal current velocities and the direction is calculated from the arctangent, where 0° is true north. You can also choose to include the up velocities, along with the horizontal velocities, in the current speed calculations. The Distribution graphics display shown in Figure 5-4 shows both current speed and direction. To view the Distribution graphics display, click the Distribution
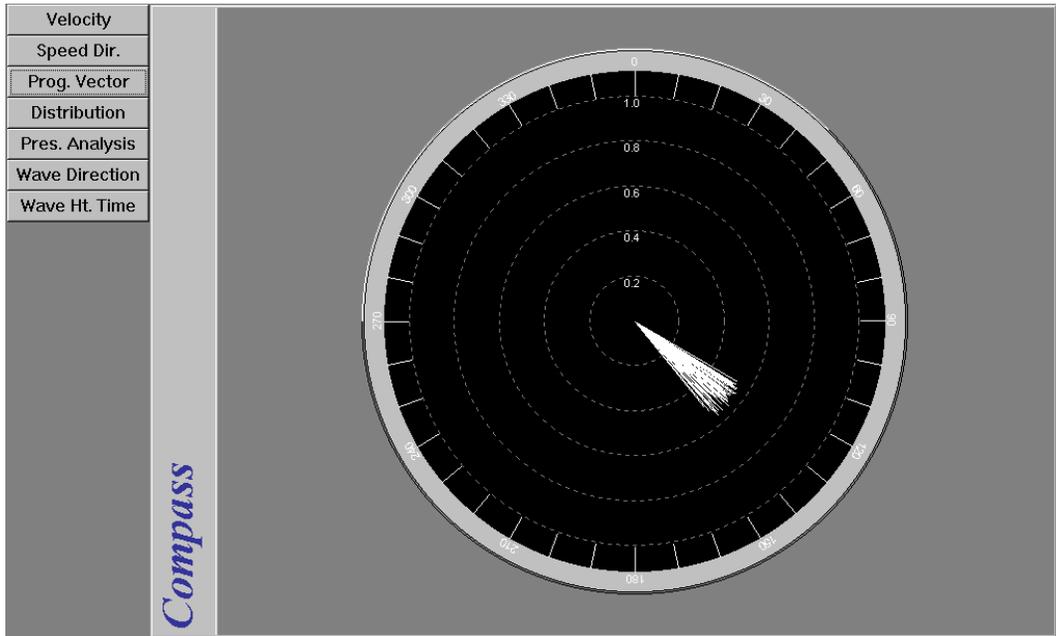
Figure 5-3: *The Progressive Vector Graphics Display*

button. For instructions on how to set up the Distribution graphics display, see "Setting up the Distribution Graphics Display" on page 5-16.
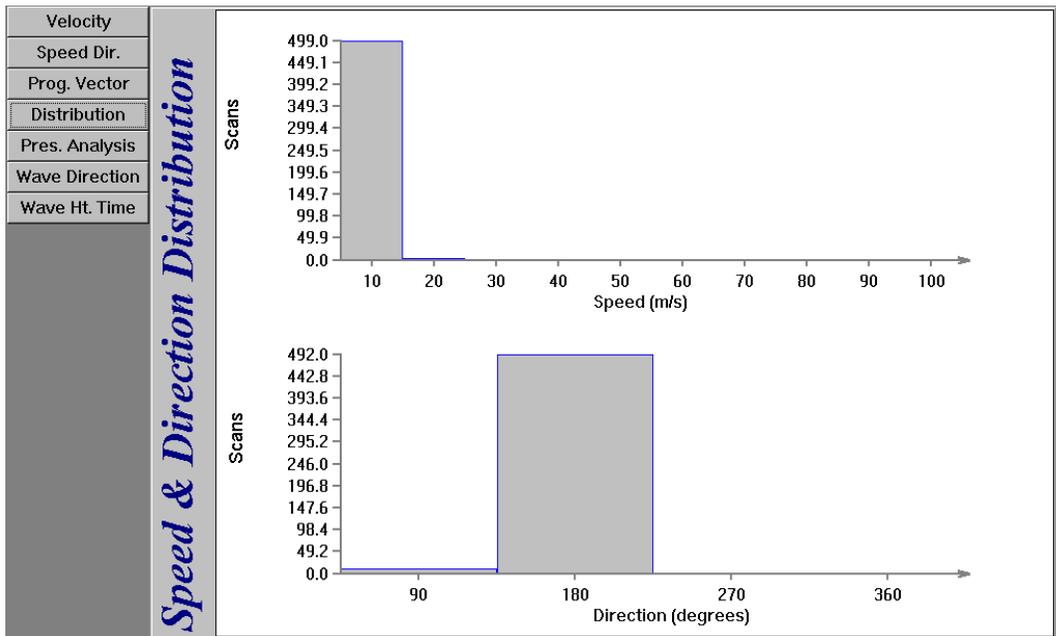

Figure 5-4: *The Distribution Graphics Display*

Viewing the Pressure Analysis Graphics Display

The Pressure Analysis graphics display, which is shown in Figure 5-5, provides both a plot of pressure in dBars verses number of scans and a frequency spectrum of wave height in m^2/Hz. In addition, processed pressure and current velocity data, which are based on the Number of Samples to Process selection in the Properties dialog box and shown plotted in blue on the graph, are displayed as wave information in the lower right corner of the graphics display. The frequency spectrum can also be displayed as a bar graph, a continuous line, or X marks. To view the Pressure Analysis graphics display, click the Press. Analysis button. For instructions on how to set up the Pressure Analysis graphics display, see "Setting up the Pressure Analysis Graphics Display" on page 5-17.
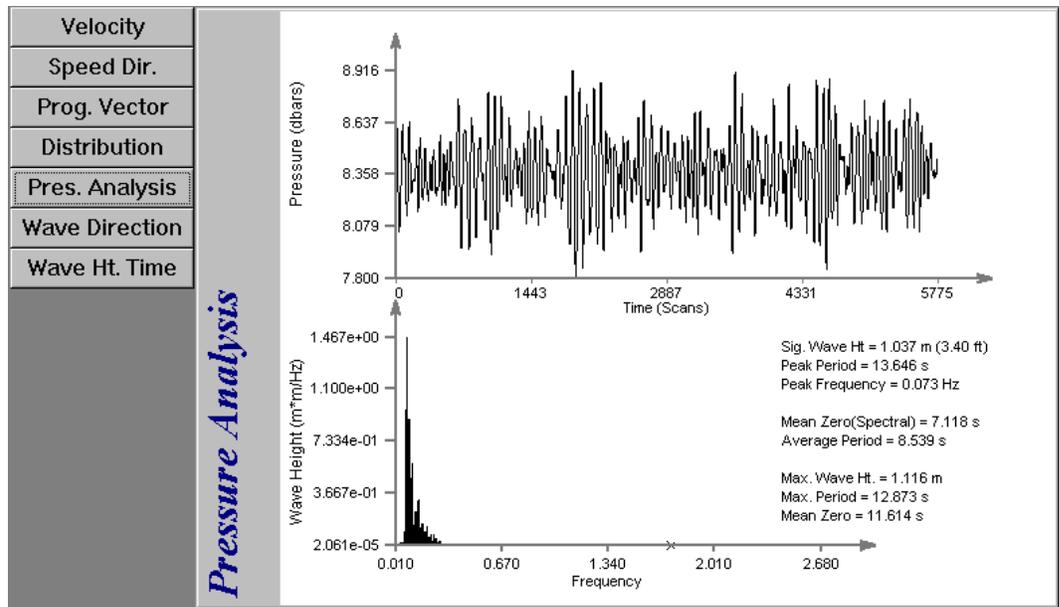
Figure 5-5: *The Pressure Analysis Graphics Display*

Viewing the Wave Direction Graphics Display

The Wave Direction graphics display, which is shown in Figure 5-6, provides a display of wave direction, frequency and height. The frequency scale is along the vertical axis, and the direction scale is along the horizontal axis. Wave height is in meters and is represented by the color of the plot at each of the graph coordinates, where the color scale is shown to the right of the display. Brown represents the highest wave height and orange the lowest. The wave information, which is also displayed at the top of the graphics display, is based on the Number of Samples to Process selection in the Properties dialog box. The Wave Direction graphics display also allows you to display the coefficients of the equation that determines the directional wave spectra in the Wave Direction Coefficients display shown in Figure 5-7. To view the Wave Direction graphics display, click the Wave

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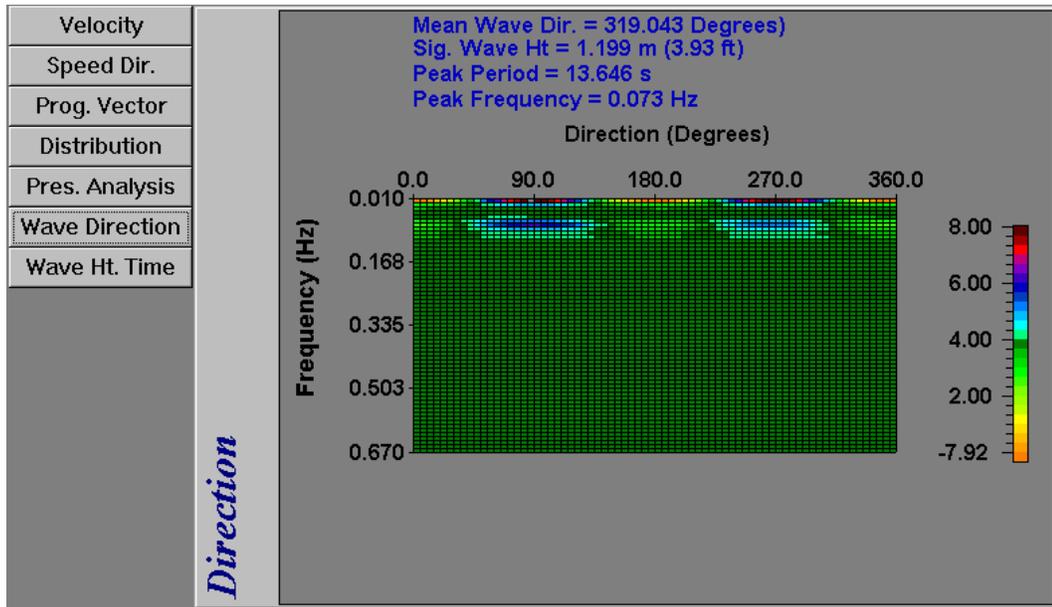
Figure 5-6: *The Wave Direction Graphics Display—Wave Direction*

Direction button. For instructions on how to set up the Wave Direction graphics display and how to view the Wave Direction Coefficients display, see "Setting up the Wave Direction Graphics Display" on page 5-19.
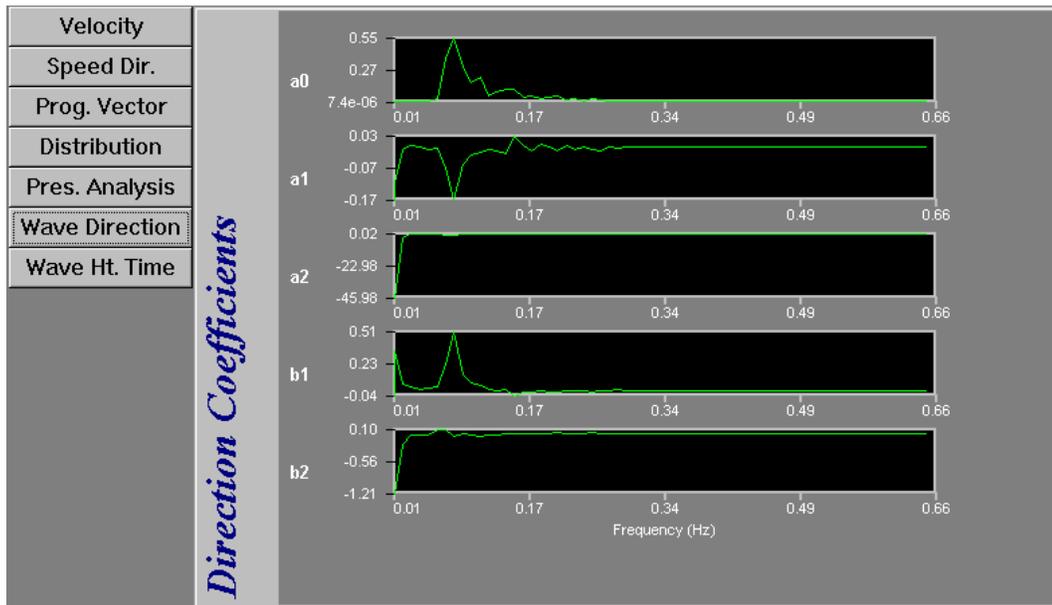
Figure 5-7: *The Wave Direction Graphics Display—Direction Coefficients*

Viewing the Wave Height and Direction Graphics Display

The Wave Height and Direction graphics display, which is shown in Figure 5-8, provides a plot of wave height or wave direction or both verses number of data sets, where a data set is the pressure and current velocity data for a selected number of contiguous scans—512, 1024, 2048, or 4096. The first scan of each data set is the first scan following a time transition in a data file. The number of scans in a data set is selected in the Number of Samples to Process area of the Properties dialog box.

WavePost uses auto processing to determine wave direction, wave frequency and wave height information from one or more data sets of pressure and current velocity data in a data file. Each point in the wave height plot in the Wave Height and Direction graphics display represents wave height in meters as determined by processing a single data set. Similarly, each point in the wave direction plot represents wave direction in degrees. (See "Auto Processing to Determine Wave Information" on page 6-1 for information on how WavePost processes the pressure and current velocity data to determine wave information.)

To view the Wave Height and Direction graphics display, click the Wave Ht. Time button. For instructions on how to set up the Wave Height and Direction graphics display, see "Setting up the Wave Height and Direction Graphics Display" on page 5-20.
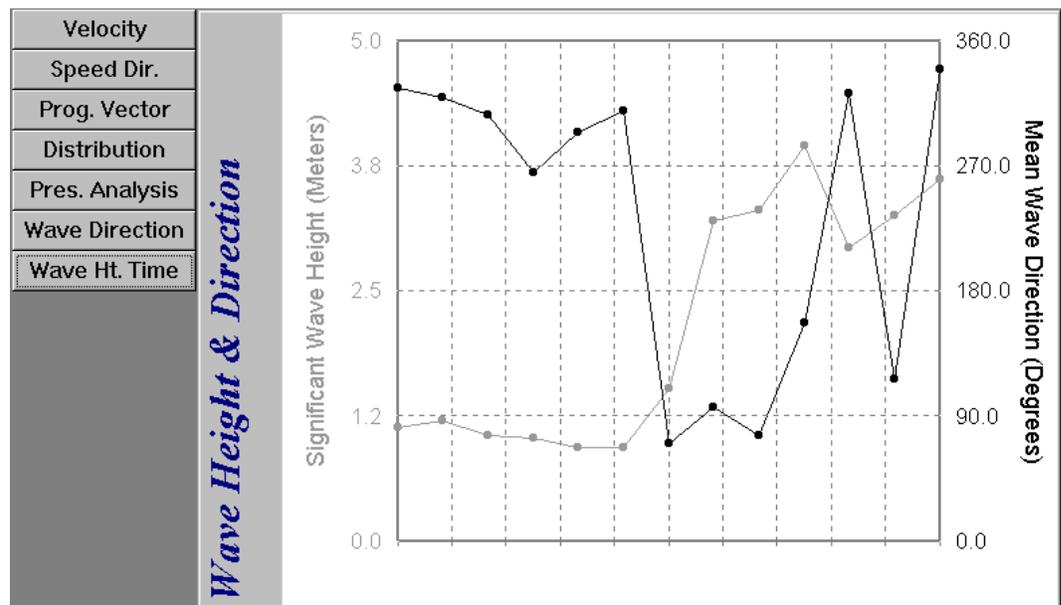

Figure 5-8: *The Wave Height and Direction Graphics Display*

Arranging the Graphics Display Windows

The graphics displays are viewed in graphics display windows, a separate window for each open data file. As in all Windows based programs, each window can be minimized, maximized, restored, resized, moved, and closed using the Control menu in the upper left corner of the window or, for some of these functions, the buttons in the upper right corner of the window. In addition, an unlimited number of windows can be open at the same time and arranged in a cascade, a vertical tile, or a horizontal tile configuration in the display area of the Main window. When minimized, a window changes to an icon, which can also be arranged with other icons.

To display multiple graphics display windows, open the data file for each. (See "Opening Data Files" on page 4-4 for instructions on how to open data files.) When a data file is opened, the Velocity Time Series graphics display opens by default in its own graphics display window. To change to any of the other graphics displays, click the corresponding button in the upper left corner of the display. To close a graphics display window, click the Cancel button. Closing a graphics display window also closes its data file.

Arranging Windows in a Cascade Configuration

When multiple graphics display windows are opened, they are automatically cascaded in the display area of the Main window as shown in Figure 4-3 on page 4-5. However, if you move the windows about the display area, they can be cascaded again.

To arrange multiple windows in a cascade configuration in the display area of the Main window, choose Window ➤ Cascade.

When windows are cascaded, they are arranged in an overlapping configuration so that each title bar is visible on each window. The front window, which is displayed in its entirety, is the active window. Clicking the title bar of any of the other windows brings the window to the front and makes it the active window.

Arranging Windows in a Vertical Tile Configuration

When multiple graphics display windows are open, they can be arranged in a vertical tile configuration as shown in Figure 5-9. Windows arranged in a vertical tile configuration altogether completely fill the display area of the Main window. Clicking a window's title bar makes it the active window.

To arrange multiple windows in a vertical tile configuration in the display area of the Main window, choose Window ➤ Tile Vertical.
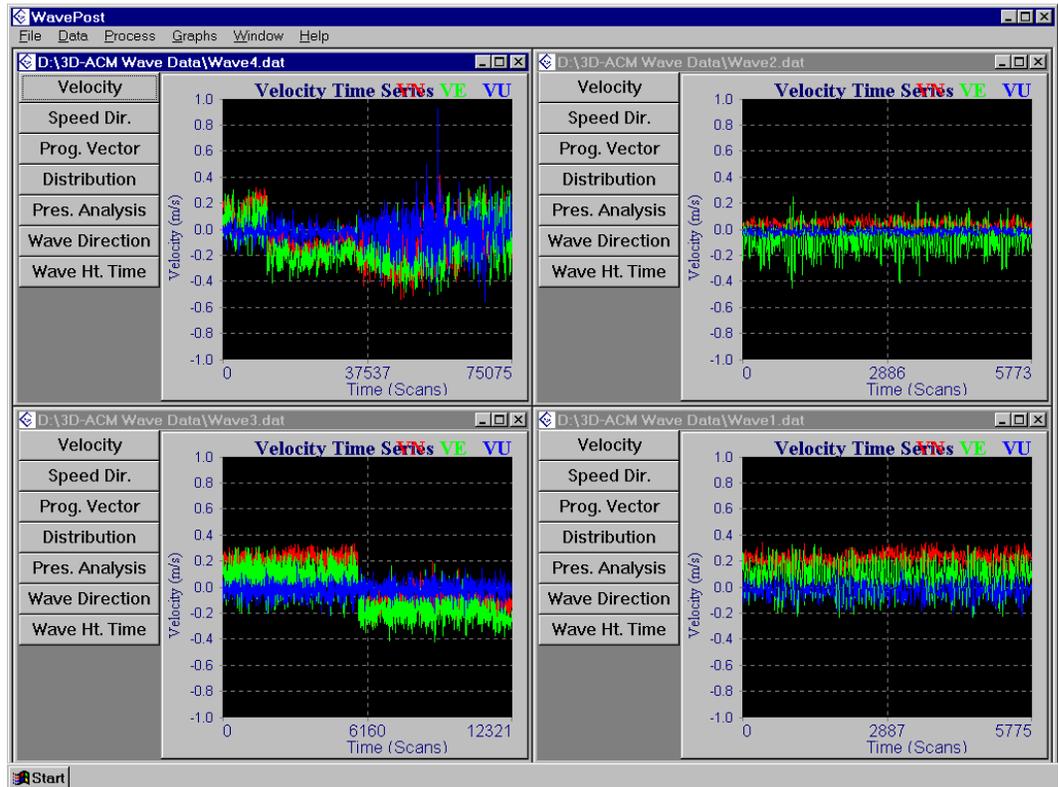
Figure 5-9: *Four Graphics Display Windows Tiled Vertically*

Arranging Windows in a Horizontal Tile Configuration

When multiple graphics display windows are open, they can be arranged in a horizontal tile configuration as shown in Figure 5-10. Windows arranged in a horizontal tile configuration altogether completely fill the display area of the Main window. Clicking a window's title bar makes it the active window.

To arrange multiple windows in a horizontal tile configuration in the display area of the Main window, choose Window ➤ Tile Horizontal.

Arranging Icons

When windows are minimized, they can be moved anywhere in the display area:

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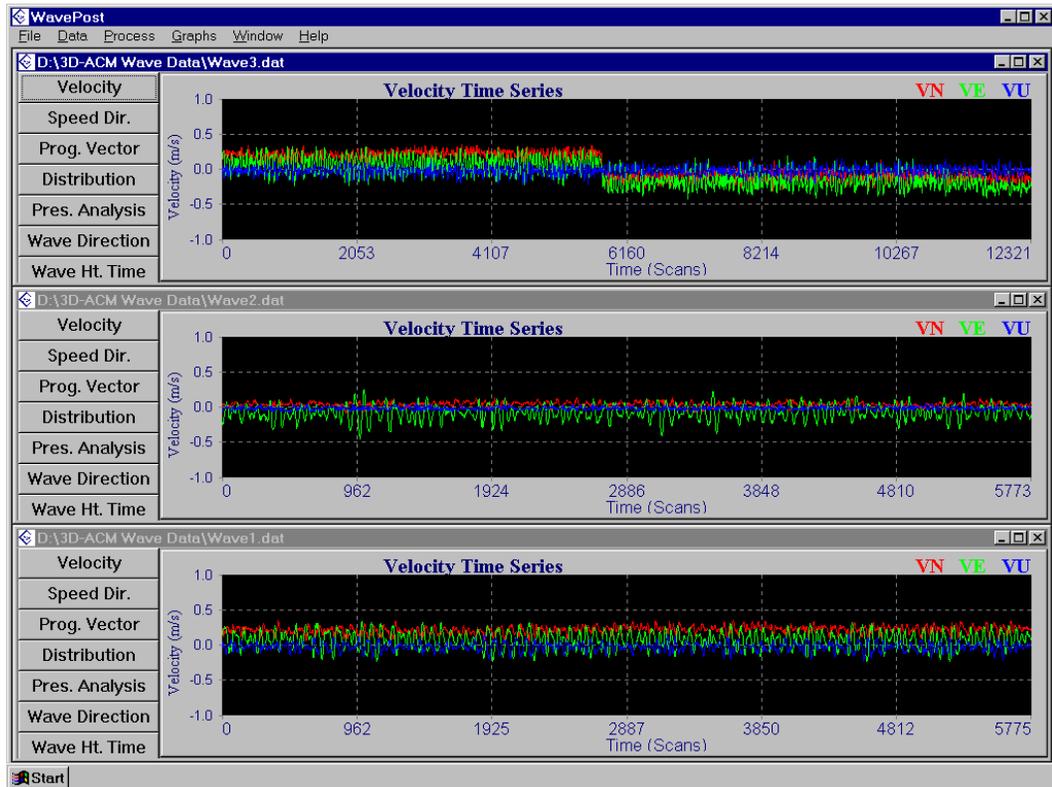
Figure 5-10: *Three Graphics Display Windows Tiled Horizontally*

To arrange the icons in a neat row at the bottom of the display area, choose
Window ➤ Arrange Icons:

Closing all the Windows at Once

All the graphics display windows can be closed simultaneously. And when closed,
their data files close also.

To close all the graphics display windows at once, choose Window ➤ Close All.

Setting up the Graphics Displays

WavePost allows you to set up the full scale ranges of the graph scales, the colors of the plots and graph backgrounds and other setup parameters—including the default setup—for the graphics displays. In addition, a title can be added for each of the graphs. The title is printed when the graph is printed. The setups are performed in seven dialog boxes corresponding to the seven graphics displays.

Setting up the Velocity Time Series Graphics Display

The Velocity Time Series graphics display can be set up to plot any combination of North Velocity, East Velocity and Up Velocity. WavePost also allows you to adjust the full scale velocity shown on the vertical axis in m/sec and select either time in Julian days or number of scans for the horizontal axis. In addition, the background color of the graph can be selected from a number of available colors, and a grid can be added.

To set up the Velocity Time Series graphics display:

1▶ Double-click anywhere in the Velocity Time Series graphics display, or right-click and then choose Graph Setup from the shortcut menu that opens.

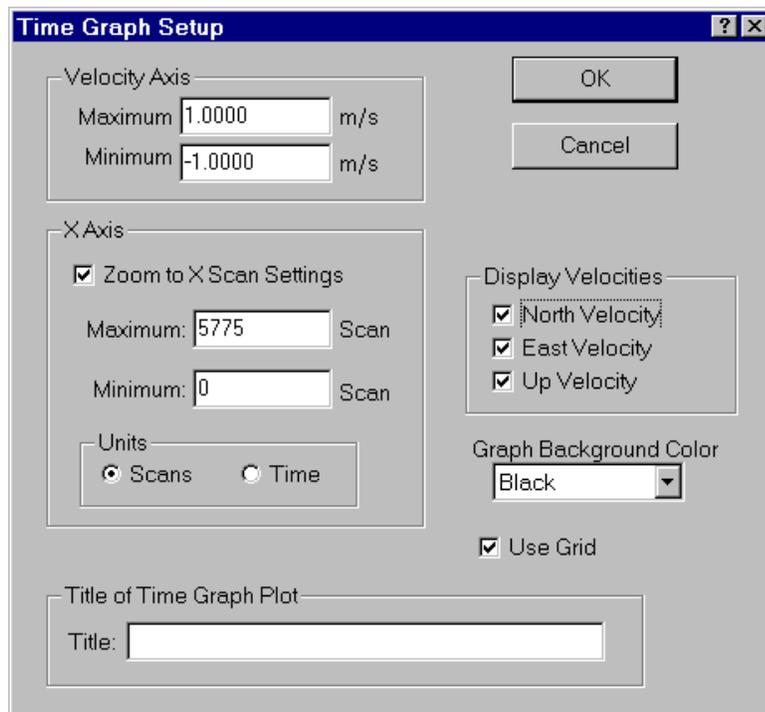The Time Graph Setup dialog box shown in Figure 5-11 opens.

Figure 5-11: *The Time Graph Setup Dialog Box*

2 In the Velocity Axis area of the Time Graph Setup dialog box, do one or both of the following to adjust the full scale velocity for the vertical axis:

- Enter the maximum velocity in m/sec in the Maximum text box.

- Enter the minimum velocity in m/sec in the Minimum text box.

3 In the X Axis area, do one or both of the following to select which scan numbers to display:

- Enter the maximum scan number in the Maximum text box.

- Enter the minimum scan number in the Minimum text box.

Note: *The minimum and maximum settings affect all seven graphics displays.*

4 Select the Zoom to X Scan Settings check box to adjust the full scale scan numbers on the horizontal axis from the minimum to the maximum scan number settings made in Step 3. Clear the check box to display all the scan numbers, and to display a box that marks the minimum and maximum scan number settings.

5 In the Units area, select Scans to scale the horizontal axis in number of scans, or Time to scale the axis in Julian days.

6 In the Display Velocities area, select the velocities you want to display.

7 In the Graph Background Color drop-down list box, select a color for the graph background.

8 Select the Use Grid check box if you want to place a grid over the graph.

9 In the Title of Time Graph Plot area, enter a title for the graph in the Title text box if you want to print a title for the graph when the graph is printed.

10 Click OK to save the new graph setup and close the Time Graph Setup dialog box, or click Cancel to close the dialog box without saving the new setup.

In addition to the settings made in the Time Graph Setup dialog box, you can automatically fit all the data in the graph plot. To do this, right-click anywhere in the graph, and then choose Zoom All from the shortcut menu that opens. WavePost automatically scales the vertical axis to fit the maximum current velocities and the horizontal axis to fit all the scan numbers. To set the Velocity Time Series graphics display as it was before selecting Zoom All, perform Step 1 through Step 3 above, and then click OK.

Setting up the Speed and Direction Graphics Display

The Speed and Direction graphics display can be set up to provide three different colors for the stick plots, depending on the range in percent of full scale in which the calculated speed falls for each scan. In addition, WavePost allows you to adjust the full scale speed shown on the vertical axis in m/sec and to choose whether to include the up velocities, along with the horizontal velocities, in the current speed calculations. You can also select to have each stick plot represent the average current speed and direction over a specified number of scans.

To set up the Speed and Direction graphics display:

1 ▶ Double-click anywhere in the Speed and Direction graphics display, or right-click and then choose Graph Setup from the shortcut menu that opens.

    The Speed and Direction Graph Options dialog box shown in Figure 5-12 opens.

2 ▶ In the Speed and Direction Graph Options area of the Speed and Direction Graph Options dialog box, enter the full scale current speed for the vertical axis in the Maximum Velocity, Y Axis text box.
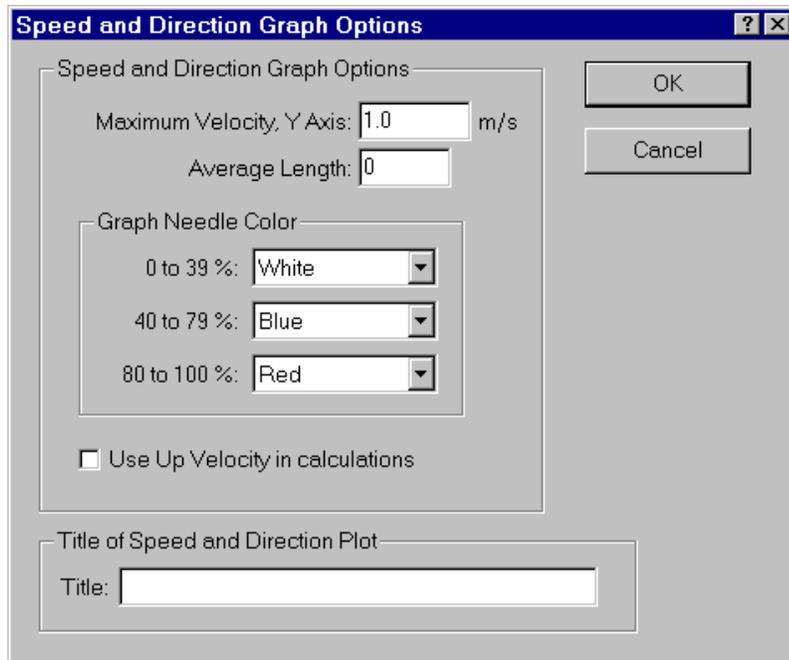

Figure 5-12: *The Speed and Direction Graph Options Dialog Box*

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3▷ Enter the number of scans over which to average the speed and direction data for each stick plot in the Average Length text box. Or enter zero if you do not want to display averages.

4▷ In the Graph Needle Color area, click the down arrow in the 0 to 39% drop-down list box and select a color for the stick plots.

The color of the sticks in the plot will be the selected color when the current speed is anywhere in the range 0 to 39% of the Maximum Velocity, Y Axis entered in Step 2.

5▷ Repeat Step 4 for the 40 to 79% and 80 to 100% drop-down list boxes.

The colors of the sticks in the plot will be the selected colors when the current speed is within the corresponding range of the Maximum Velocity, Y Axis.

6▷ Select the Use Up Velocity in calculations check box if you want to include the up velocities, along with the horizontal velocities, in the current speed calculations.

7▷ In the Title of Speed and Direction Plot area, enter a title for the graph in the Title text box if you want to print a title for the graph when the graph is printed.

8▷ Click OK to save the new graph setup and close the Speed and Direction Graph Options dialog box, or click Cancel to close the dialog box without saving the new setup.

Setting up the Progressive Vector Graphics Display

The Progressive Vector graphics display can be set up to provide three different colors for the vector plots, depending on the range in percent of full scale in which the calculated speed falls for each scan. In addition, WavePost allows you to adjust the full scale speed shown on the polar graph in m/sec and to choose whether to include the up velocities, along with the horizontal velocities, in the current speed calculations. You can also choose to sum the vector plots and to select to have each vector plot represent the average current speed and direction over a specified number of scans.

To set up the Progressive Vector graphics display:

1▷ Double-click anywhere in the Progressive Vector graphics display, or right-click and then choose Graph Setup from the shortcut menu that opens.

The Progressive Vector Graph Options dialog box shown in Figure 5-13 opens.
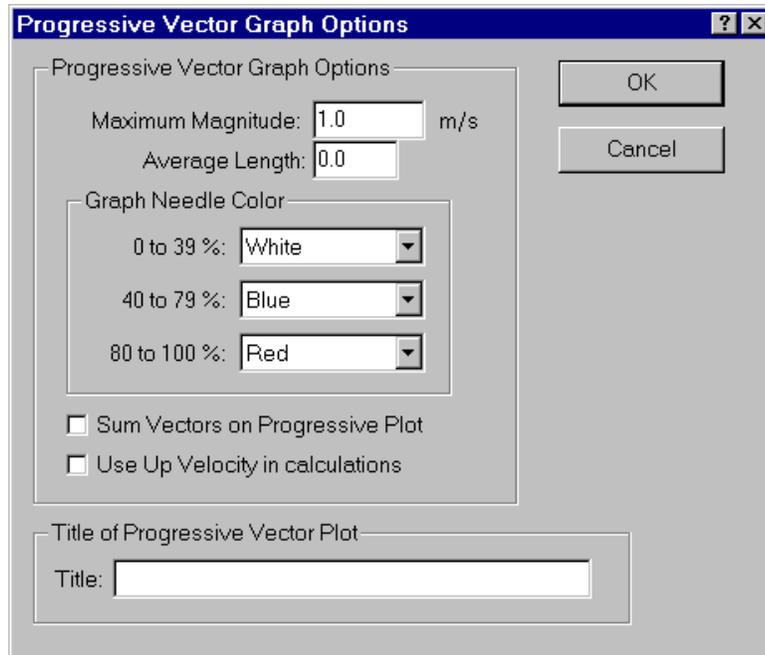
Figure 5-13: *The Progressive Vector Graph Options Dialog Box*

2▶ In the Progressive Vector Graph Options area of the Progressive Vector Graph Options dialog box, enter the full scale current speed for the polar graph in the Maximum Magnitude text box.

3▶ Enter the number of scans over which to average the speed and direction data for each vector plot in the Average Length text box. Or enter zero if you do not want to display averages.

4▶ In the Graph Needle Color area, click the down arrow in the 0 to 39% drop-down list box and select a color for the vector plots.

The color of the vectors in the plot will be the selected color when the current speed is anywhere in the range 0 to 39% of the Maximum Magnitude entered in Step 2.

5▶ Repeat Step 4 for the 40 to 79% and 80 to 100% drop-down list boxes.

The colors of the vectors in the plot will be the selected colors when the current speed is within the corresponding range of the Maximum Magnitude.

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6 ▶ Select the Sum Vectors on Progressive Plot check box if you want to sum the vector plots.

If you select the Sum Vectors on Progressive Plot check box, WavePost sums the vector plots end to end, displaying a figure eight if the current is tidal.

7 ▶ Select the Use Up Velocity in calculations check box if you want to include the up velocities, along with the horizontal velocities, in the current speed calculations.

8 ▶ In the Title of Progressive Vector Plot area, enter a title for the graph in the Title text box if you want to print a title for the graph when the graph is printed.

9 ▶ Click OK to save the new graph setup and close the Progressive Vector Graph Options dialog box, or click Cancel to close the dialog box without saving the new setup.

Setting up the Distribution Graphics Display

The Distribution graphics display can be set up to display current speed or current direction or both verses number of scans. In addition, you can choose whether to include the up velocities, along with the horizontal velocities, in the current speed calculations.

To set up the Distribution graphics display:

1 ▶ Double-click anywhere in the Distribution graphics display, or right-click and then choose Graph Setup from the shortcut menu that opens.

The Distribution Graph Options dialog box shown in Figure 5-14 opens.

2 ▶ In the Plotting Options area of the Distribution Graph Options dialog box, select the Speed, the Direction or the Plot Both option.

3 ▶ Select the Use Up Velocity in calculations check box if you want to include the up velocities, along with the horizontal velocities, in the current speed calculations.

4 ▶ In the Title of Distribution Plot area, enter a title for the graph in the Title text box if you want to print a title for the graph when the graph is printed.

5 ▶ Click OK to save the new graph setup and close the Distribution Graph Options dialog box, or click Cancel to close the dialog box without saving the new setup.
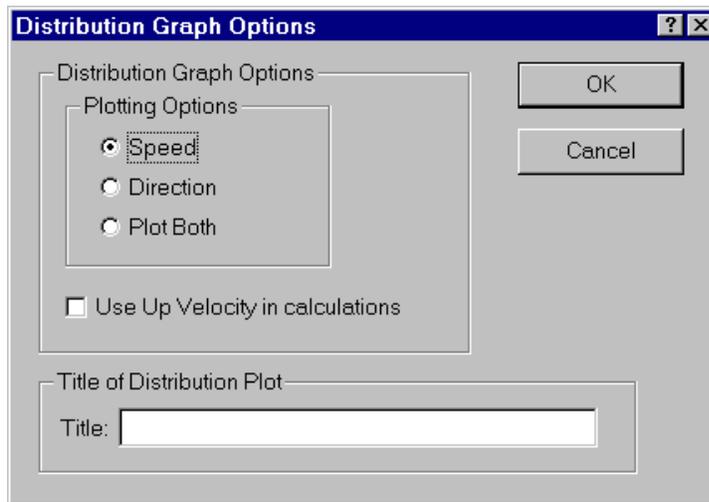
Figure 5-14: *The Distribution Graph Options Dialog Box*

Setting up the Pressure Analysis Graphics Display

The Pressure Analysis graphics display displays both a plot of pressure and a frequency spectrum of wave height, and can be set up to display the wave frequency spectrum in any of three frequency scales and in any of three available spectrum display styles.

To set up the Pressure Analysis graphics display:

1 ▶ Double-click anywhere in the Pressure Analysis graphics display, or right-click and then choose Graph Setup from the shortcut menu that opens.

The Pressure Analysis Setup dialog box shown in Figure 5-15 opens.

2 ▶ In the Spectrum Display area of the Pressure Analysis Setup dialog box, select the Bar Graph, the Continuous Line or the X Marks option.

3 ▶ In the X Axis, Time and Pressure Plots area, do one or both of the following to select which scan numbers to display:

• Enter the maximum scan number in the Maximum text box.

• Enter the minimum scan number in the Minimum text box.

Note: *The minimum and maximum settings affect all seven graphics displays.*
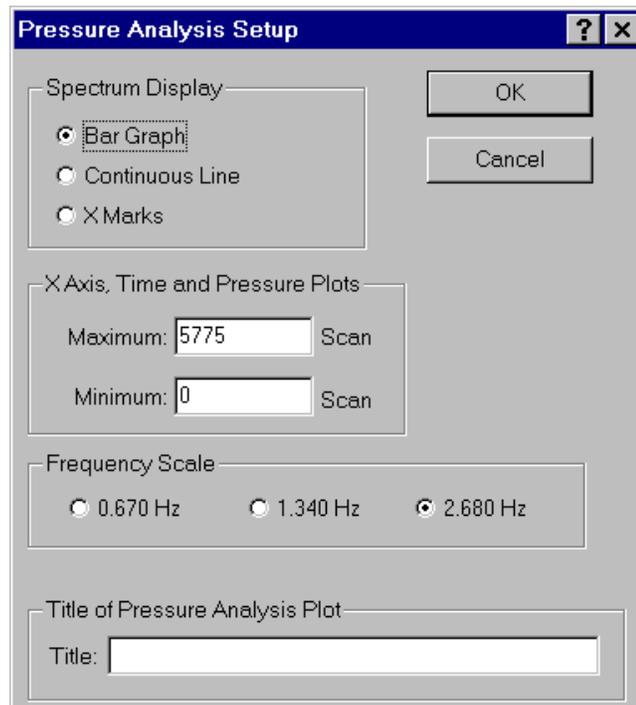
Figure 5-15: *The Pressure Analysis Setup Dialog Box*

4 In the Frequency Scale area, select a frequency scale for the wave height frequency spectrum.

The selected frequency scale determines full scale for the horizontal axis of the wave height frequency spectrum.

5 In the Title of Pressure Analysis Plot area, enter a title for the graph in the Title text box if you want to print a title for the graph when the graph is printed.

6 Click OK to save the new graph setup and close the Pressure Analysis Setup dialog box, or click Cancel to close the dialog box without saving the new setup.

Setting up the Wave Direction Graphics Display

The Wave Direction graphics display displays wave direction, wave frequency and wave height, where any of three frequency scales can be selected.

To set up the Wave Direction graphics display:

1 ▶ Double-click anywhere in the Wave Direction graphics display, or right-click and then choose Graph Setup from the shortcut menu that opens.

The Direction Setup dialog box shown in Figure 5-16 opens.

Figure 5-16: *The Direction Setup Dialog Box*

2 ▶ In the Plot Type area of the Direction Setup dialog box, select Direction to display the Wave Direction graphics display, or select Coefficients to display the Wave Direction Coefficients graphics display.
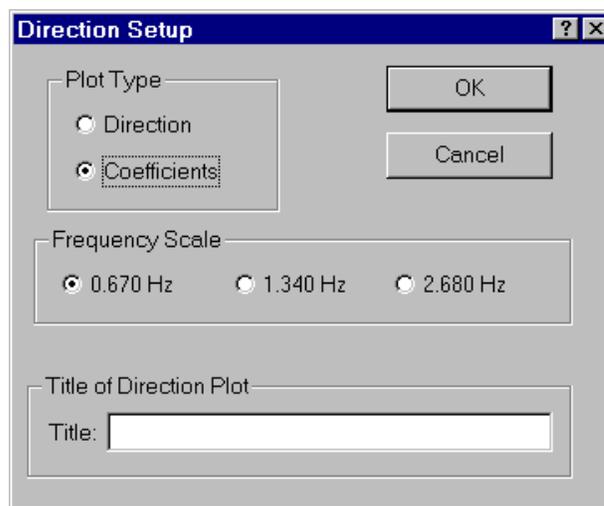
3 ▶ In the Frequency Scale area, select a frequency scale for the wave height frequency spectrum.

The selected frequency scale determines full scale for the vertical axis.

4 ▶ In the Title of Direction Plot area, enter a title for the graph in the Title text box if you want to print a title for the graph when the graph is printed.

5 ▶ Click OK to save the new graph setup and close the Direction Setup dialog box, or click Cancel to close the dialog box without saving any changes.

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Setting up the Wave Height and Direction Graphics Display

The Wave Height and Direction graphics display can be set up to display wave height or wave direction or both verses number of data sets.

To set up the Wave Height and Direction graphics display:

1▶ Double-click anywhere in the Wave Height and Direction graphics display, or right-click and then choose Graph Setup from the shortcut menu that opens.

The Wave Height Setup dialog box shown in Figure 5-17 opens.
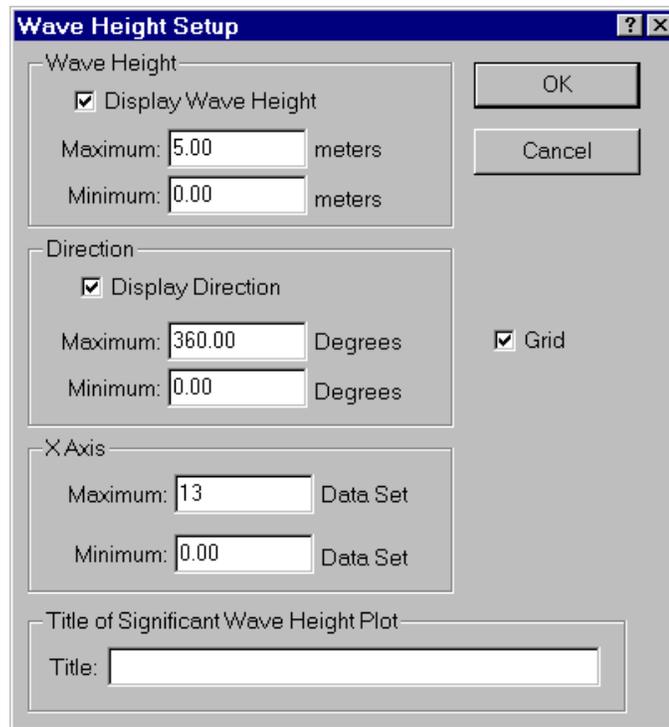
Figure 5-17: *The Wave Height Setup Dialog Box*

2▶ In the Wave Height area of the Wave Height Setup dialog box, select the Display Wave Height check box if you want to display wave height.

If you select the Display Wave Height check box, do one or both of the following to adjust the full scale wave height for the vertical axis:

• Enter the maximum wave height in meters in the Maximum text box.

• Enter the minimum wave height in meters in the Minimum text box.

3 In the Direction area, select the Display Direction check box if you want to display wave direction.

If you select the Display Direction check box, do one or both of the following to adjust the full scale wave direction for the vertical axis:

- Enter the maximum wave direction in degrees in the Maximum text box.

- Enter the minimum wave direction in degrees in the Minimum text box.

4 In the X Axis area, do one or both of the following to select which data sets to display:

- Enter the maximum data set in the Maximum text box.

- Enter the minimum data set in the Minimum text box.

5 Select the Grid check box if you want to place a grid over the graph.

6 In the Title of Significant Wave Height Plot area, enter a title for the graph in the Title text box if you want to print a title for the graph when the graph is printed.

7 Click OK to save the new graph setup and close the Wave Height Setup dialog box, or click Cancel to close the dialog box without saving the new setup.

Changing the Default Graphics Display Setups

When any of the graphics displays are first opened in a graphics display window, the graphics display setup is the last saved default setup. Changing the setup for a graphics display does not change the *default* graphics display setup; the changed setup remains in effect only while the data file is open. And for a data file to remain open, a graphics display window for the data file must remain open. WavePost allows you to change the default setup for any of the graphics displays. The changed default setup, however, becomes effective only *after* WavePost is restarted.

> *Note: A data file does not have to be open to change the default setup for a graphics display.*

To change the default setup for one or more graphics displays:

1 Select Graph from the menu bar, and then choose a graphics display from the Graph menu when it opens.

The options or setup dialog box for the selected graphics display opens.

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2 ▶ Change the graphics display settings in accordance with your requirements.

3 ▶ Click OK to save the new default setup for the graphics display.

4 ▶ Repeat Step 1 through Step 3 for each graphics display for which you want to change the default setup.

5 ▶ Exit and then restart WavePost.

The new default graphics display setups take effect.

Printing the Graphs

The graph for any graphics display can be printed, and before printing, it can be previewed. To print preview or print a graph, the graphics display window containing the graph must be the active window.

> *Note:* *If necessary, before printing a graph, set up the page first. To set up the page, choose File* ▶ *Print Setup and follow the instructions in the Page Setup dialog box that opens. Once the page is set up, it is not necessary to set it up again unless your page requirements change.*

To print preview and print a graph:

1 ▶ Open one or more data files.

WavePost reads the data files and the Velocity Time Series graphics display for each data file opens.

2 ▶ If more than one data file is open, click the title bar of the graphics display window for which you want to print a graph.

The graphics display window is made active. If only one data file is open, the graphics display window for that data file will already be the active window.

3 ▶ If you want to print a graph other than the Velocity Time Series graph, select the graphics display for the graph you want to print by clicking the corresponding button in the upper left corner of the display.

4 ▶ If you want to print a title for the graph, double-click anywhere in the graphics display to open the options or setup dialog box for the display. Or right-click and then choose Graph Setup from the shortcut menu that opens. Enter the title in the Title text box, and then click OK.

5 If you want to print header information, choose File ➤ Properties to open the Properties dialog box. Select the Header check box in the Print Options area, and then click OK.

6 Choose File ➤ Print Preview to preview the graph before printing, or File ➤ Print to print the graph without previewing.

If you choose Print Preview, the Print Preview window shown in Figure 5-18 opens, which shows an example print preview of the Velocity Time Series graph. To print the graph, click the Print Graph button in the upper left corner of the Print Preview window, select your printer in the Print dialog box that opens, and then click OK. Or if you do not want to print the graph, click the Close button to close the Print Preview window without printing.

If you choose Print directly from the File menu, select your printer in the Print dialog box that opens, and then click OK.
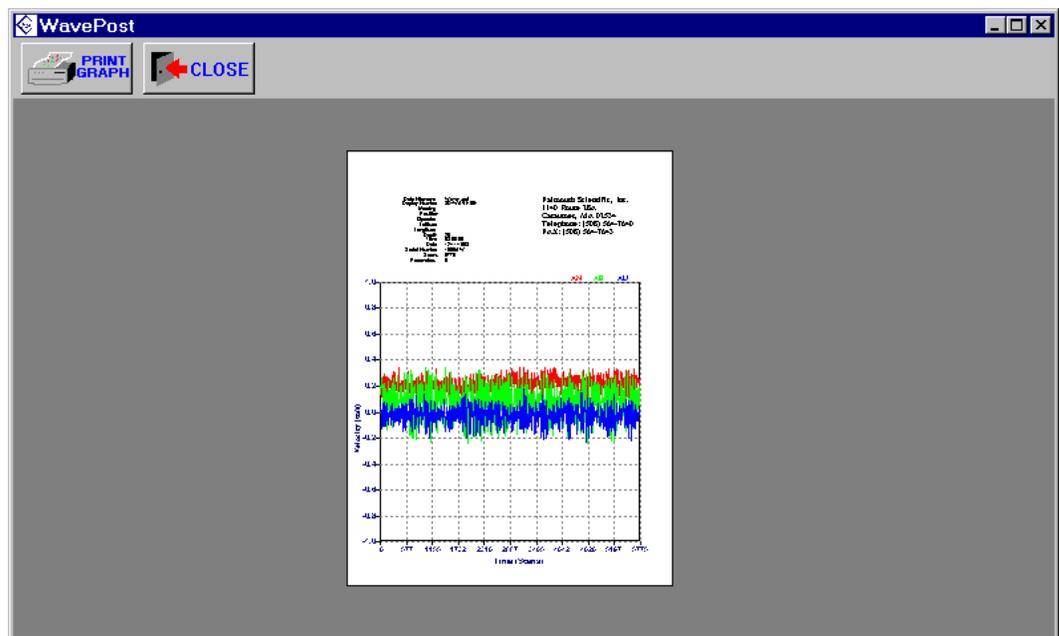

Figure 5-18: *Example Print Preview of the Velocity Time Series Graph*

Figure 5-19 through Figure 5-26 in the following pages show example printouts of the graphs for each of the seven graphics displays, along with the Wave Direction Coefficients graph.
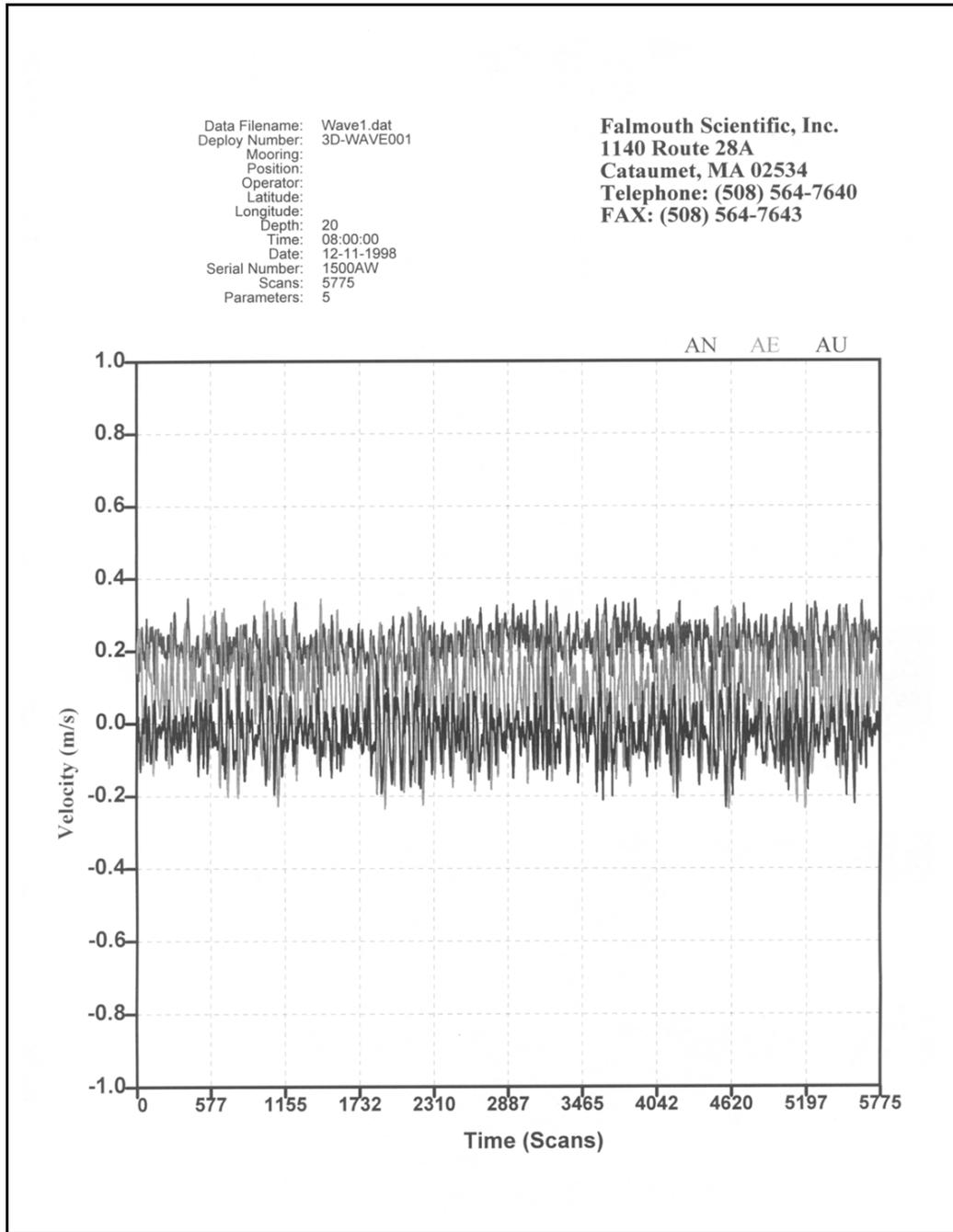
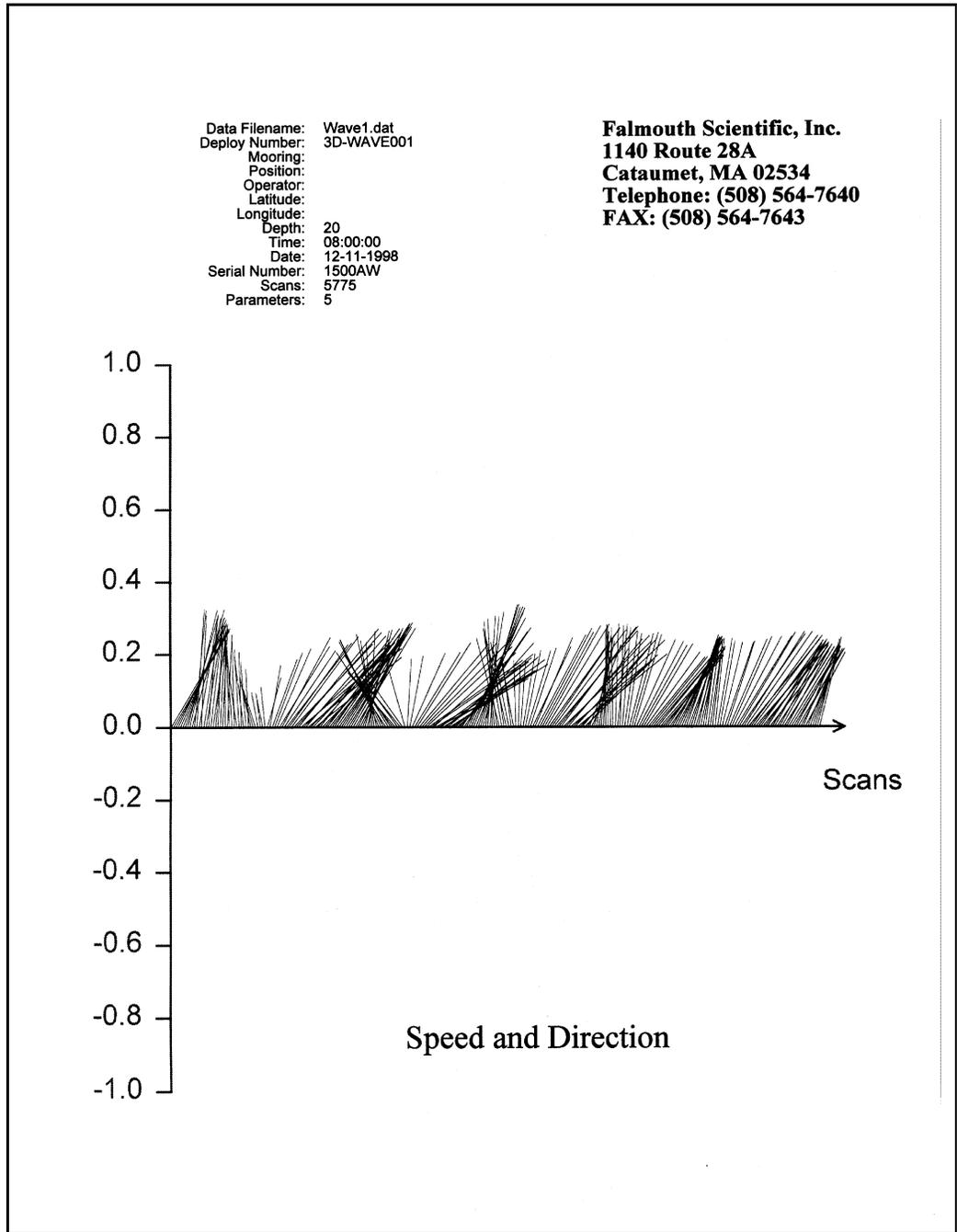**Figure 5-19: *Example Velocity Time Series Graph Printout***

Figure 5-20: *Example Speed and Direction Graph Printout*

Data Filename: Wave1.dat
Deploy Number: 3D-WAVE001
Mooring:
Position:
Operator:
Latitude:
Longitude:
Depth: 20
Time: 08:00:00
Date: 12-11-1998
Serial Number: 1500AW
Scans: 5775
Parameters: 5

Falmouth Scientific, Inc.
1140 Route 28A
Cataumet, MA 02534
Telephone: (508) 564-7640
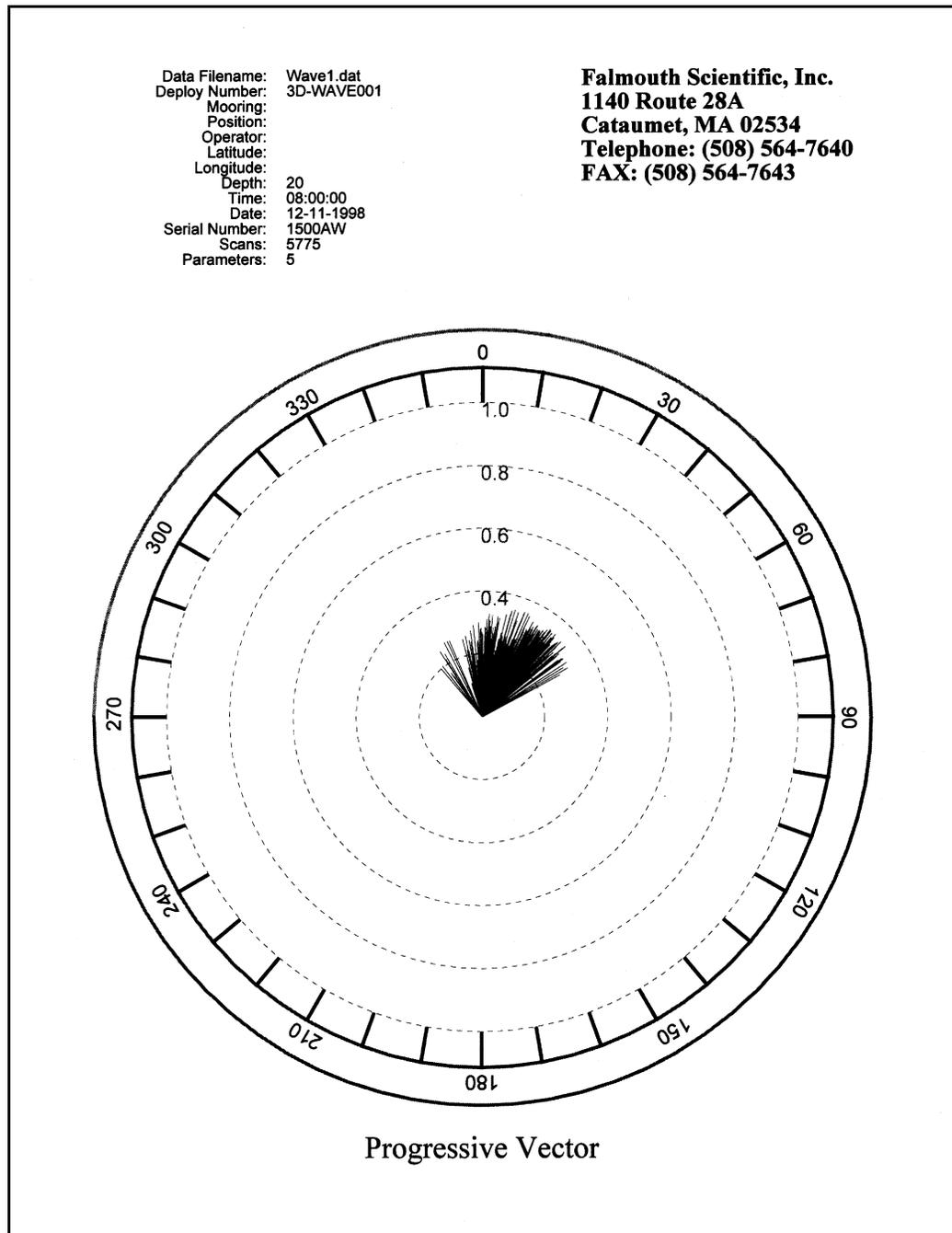**FAX: (508) 564-7643**

Progressive Vector

Figure 5-21: *Example Progressive Vector Graph Printout*
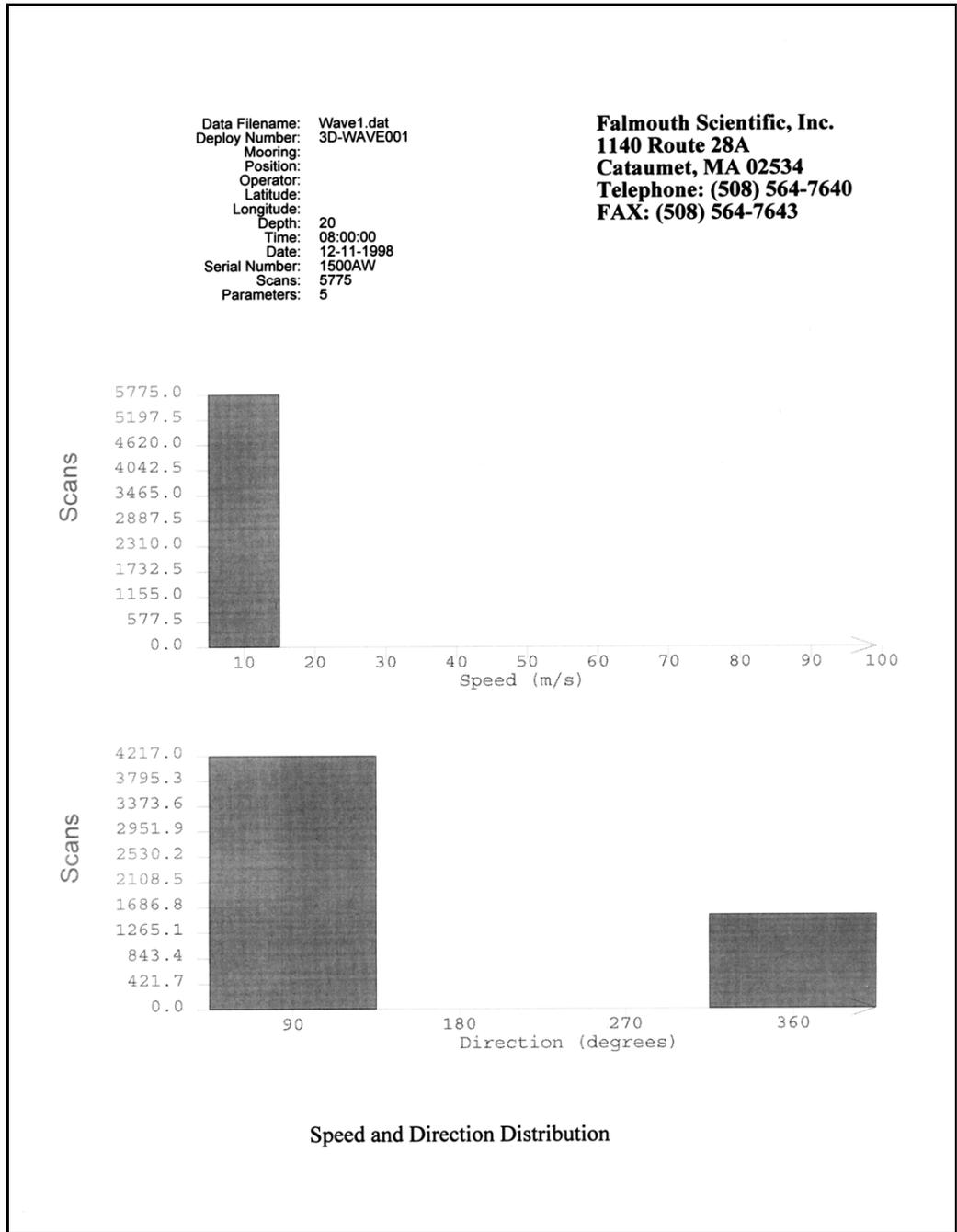
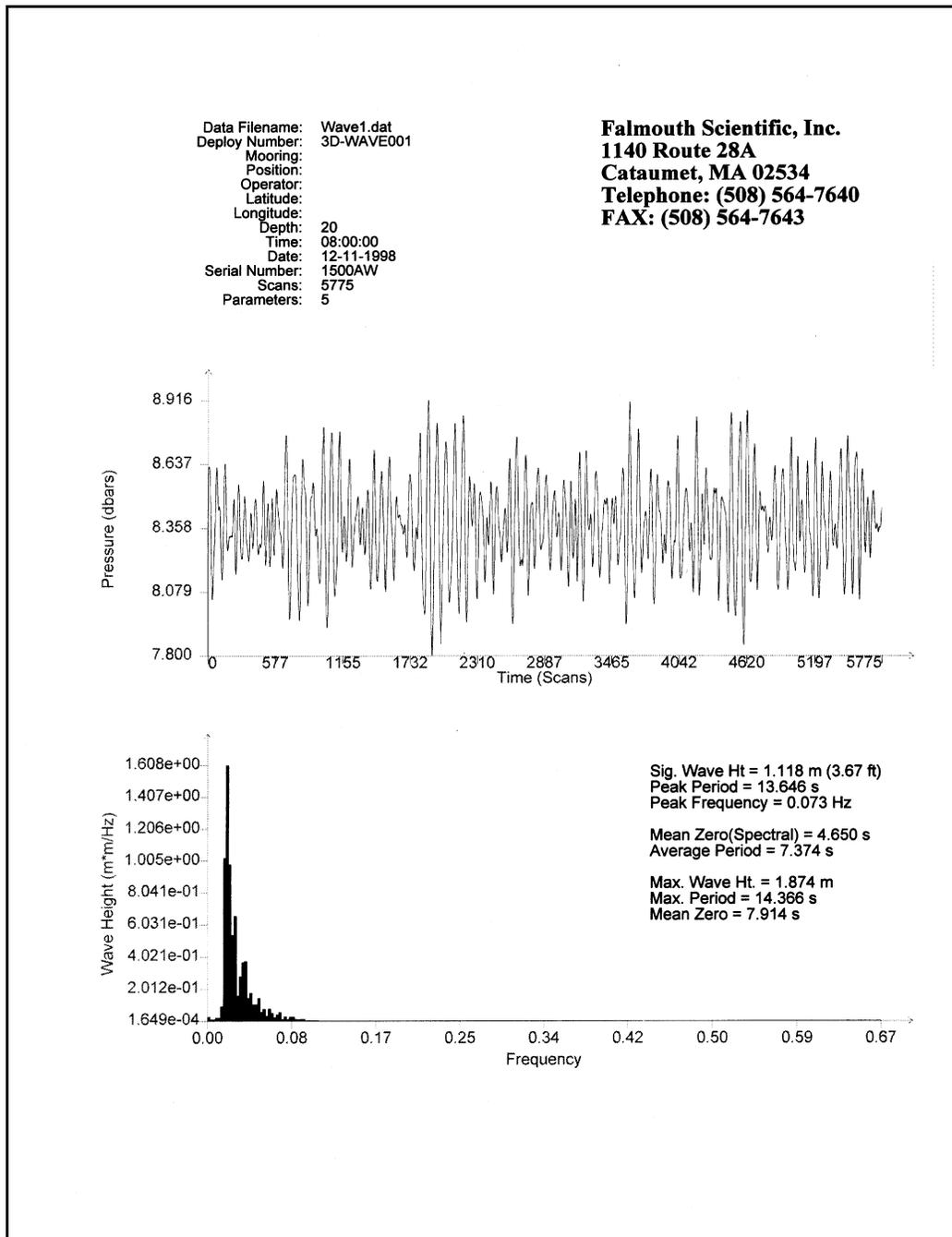**Figure 5-22: *Example Distribution Graph Printout***

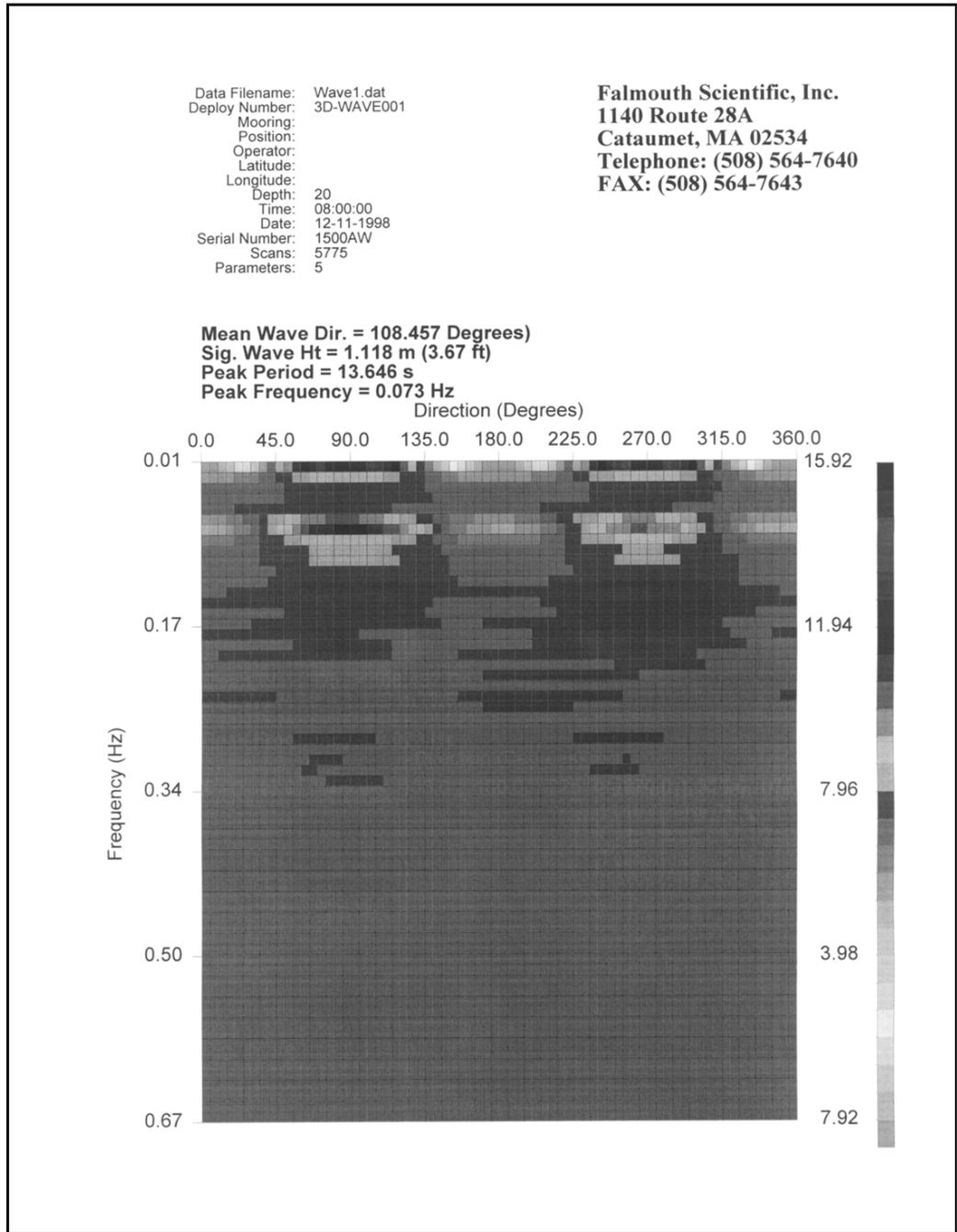**Figure 5-23:** *Example Pressure Analysis Graph Printout*

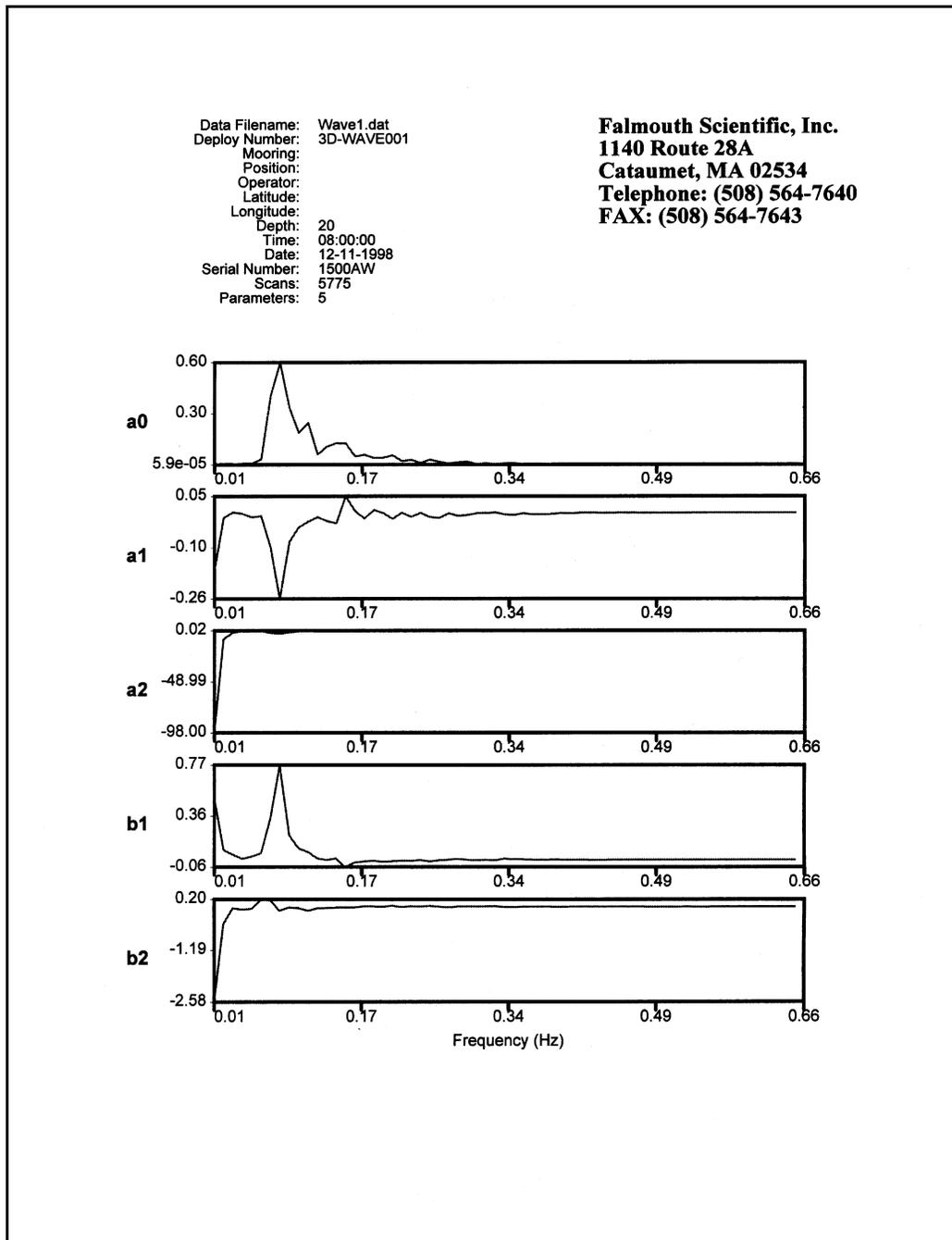**Figure 5-24:** *Example Wave Direction Graph Printout*

Figure 5-25: *Example Wave Direction Coefficients Graph Printout*
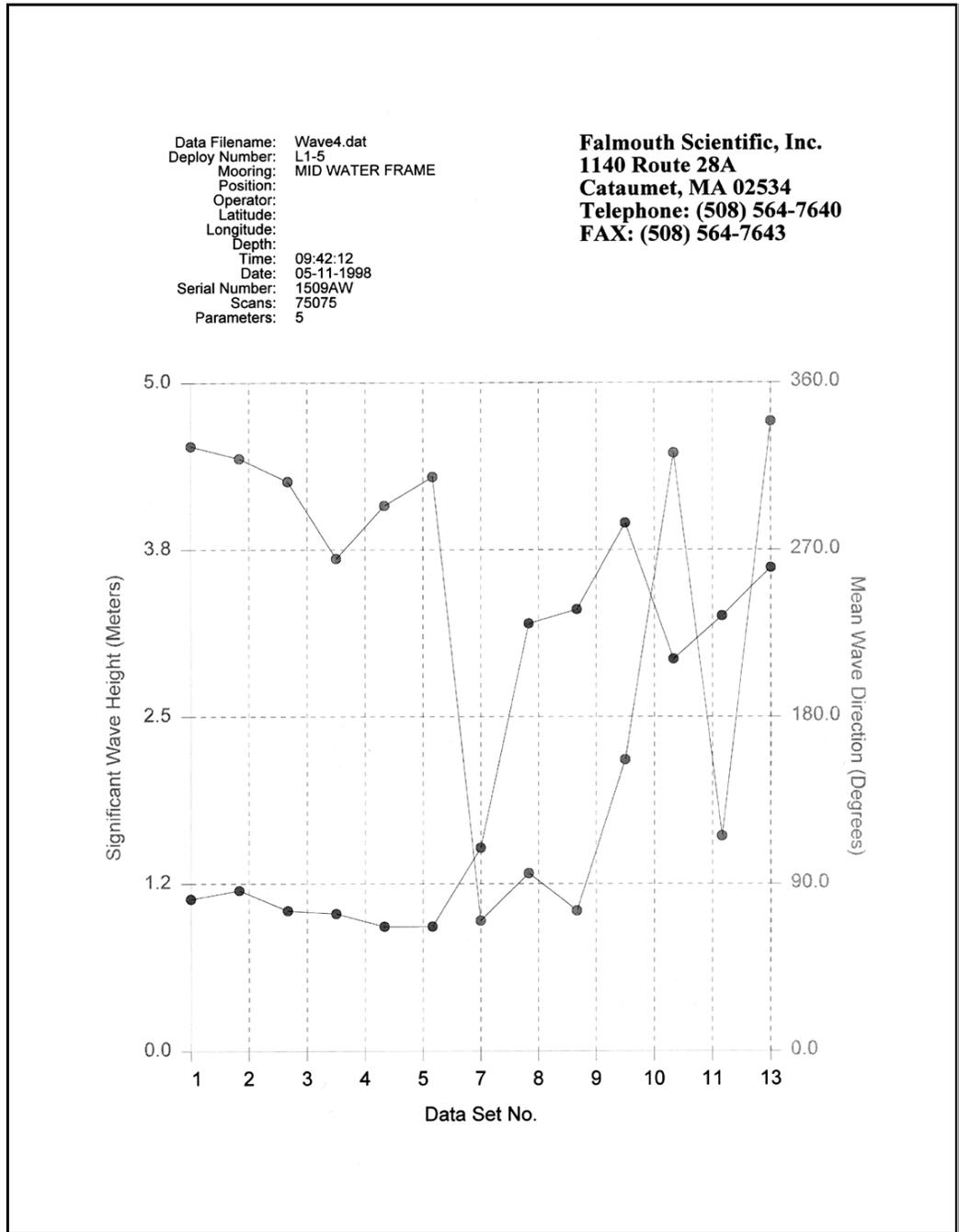
Figure 5-26: *Example Wave Height and Direction Graph Printout*

SECTION 6: Auto Processing and Exporting Data

To determine wave direction, wave frequency and wave height information, WavePost processes a selected data set of the pressure and current velocity data in a data file. The resulting wave information is displayed in the Pressure Analysis and Wave Direction graphics displays. The data set of pressure and current velocity data processed is shown in blue in the Pressure Analysis graphics display. WavePost can, however, process *multiple* data sets automatically using auto process and save the resulting wave information to a file. This wave information is also displayed in the Wave Height and Direction graphics display. This section describes auto processing and how to use it to process the pressure and current velocity data and save the resulting wave information for an entire data file in a new ASCII data file. In addition, instructions are provided on how to export all the parameter data in a data file along with the calculated current speed and direction.

To auto process the pressure data in a data file, or to export the parameter data in a data file, you must first open the data file as described in "Opening Data Files" on page 4-4. Any number of data files can be open at the same time. When a data file is opened, the Velocity Time Series graphics display opens by default.

Auto Processing to Determine Wave Information

Auto processing is the means by which WavePost processes multiple data sets of pressure and current velocity data in a data file to determine wave direction, wave frequency and wave height information.

Types of Wave Information

Auto processing provides four different types of wave information:

- Wave Average Results
- Wave Spectrum Results
- Wave Directional Coefficients
- Wave Direction Spectrum

When saving the wave information to a file, WavePost always saves the Wave Average Results for each data set. However, because the files can be very large, WavePost allows you to save any combination of the other types of wave information.

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The Wave Average Results include the following information:

- Data set No.
- Time stamp
- Significant wave height
- Peak period
- Peak frequency
- Mean zero (spectral)
- Average period
- Maximum wave height
- Maximum wave period
- Mean zero
- Mean wave direction

The Wave Spectrum Results provides wave frequency data based on pressure data; the Wave Directional Coefficients are the coefficients a0, a1, b1, a2, b2, and are based on pressure and current velocity data; and the Wave Direction Spectrum provides wave direction and frequency data for every 5 degrees over a 360 degree range based on pressure and current velocity data.

Wave Analysis Methods Used by WavePost

The Wave Spectrum Results, the Wave Directional Coefficients and the Wave Direction Spectrum are derived from wave analysis methods used by the Field Wave Gaging Program (FWGP) networks, where the analysis methods are generally accepted by the oceanographic and coastal engineering communities.

The analysis consists of the following eight steps, which are performed by auto processing in the order in which they are listed:

1. Demean each segment.
2. Remove trend from each segment.
3. Apply 10% cosine taper for each segment.
4. Maintain variance.
5. Perform 512-scan FFT.
6. Analyze in frequency bands of 1/512–5/512 Hz.
7. Apply depth correction factor of 31.63.
8. Perform directional analysis - Longuet-Higgens, Cartwright and Smith (1963)

Auto processing searches the entire data file for interval boundaries. An interval boundary occurs at the start of each Interval Time, where the 3D-ACM Wave turns on and collects parameter data for the Average On Time or the Burst On Time. However, for an interval boundary to be detected, the data file must have a time stamp for each data record.

> *Note:* *For more information on how the 3D-ACM Wave collects parameter data and records a time stamp for each record, and for the definition of Interval Time, Average On Time, and Burst On Time, refer to the "3DACM97 Configuration and Acquisition Software User Manual" provided with the 3D-ACM Wave.*

When an interval boundary is detected, a wave height and direction analysis is performed on a selected data set, which is the pressure and current velocity data for a selected number of contiguous scans—512, 1024, 2048, or 4096. The number of scans in a data set is selected in the Number of Samples to Process area of the Properties dialog box. (See "Verifying the Data File Configuration" on page 4-1 for instructions on how to select the number of scans in a data set.)

To obtain the Wave Spectrum Results, the pressure data in each data set is processed as described in Step 1 through Step 7 above. If the number of scans in a data set is greater than 512, processing is performed on 50% overlapping segments of 512 scans each, where the spectra data from each segment is added to the next segment until the total number of scans in the data set is reached. The accumulated spectrum is divided by the number of segments in the data set to produce the Wave Spectrum Results, from which wave height is computed.

Similarly, to obtain the Wave Directional Coefficients *and* the Wave Direction Spectrum, each segment in a data set of pressure, instantaneous current velocity north (VN) and east (VE) is processed. The result is further processed, as described in Step 8, using the directional analysis method of Longuet-Higgens, Cartwright and Smith.

Auto processing is the same processing that determines the wave information in the Wave Height and Direction graphics display. It is also the same processing used in the Pressure Analysis and Wave Direction graphics displays. However, in the latter case, only one data set is processed—the data set shown in blue in the Pressure Analysis graphics display. You can shift the data set along the display by adjusting the minimum and maximum scan numbers in either the Time Graph Setup dialog box or the Pressure Analysis Setup dialog box. Here also, the number of scans in the data set is selected in the Properties dialog box. Auto processing, therefore, eliminates the task of manually adjusting the minimum and maximum scan settings to position a data set at each of the time transitions in a data file in order to determine wave information.

Auto Processing the Data

To auto process the pressure and current velocity data:

1▸ Open one or more data files.

WavePost reads the data files and the Velocity Time Series graphics display for each data file opens.

2▸ If more than one data file is open, click the title bar of the graphics display window corresponding to the data file to be auto processed.

The graphics display window is made active. If only one data file is open, the graphics display window for that data file will already be the active window.

3▸ Choose Process ➤ Auto Process.

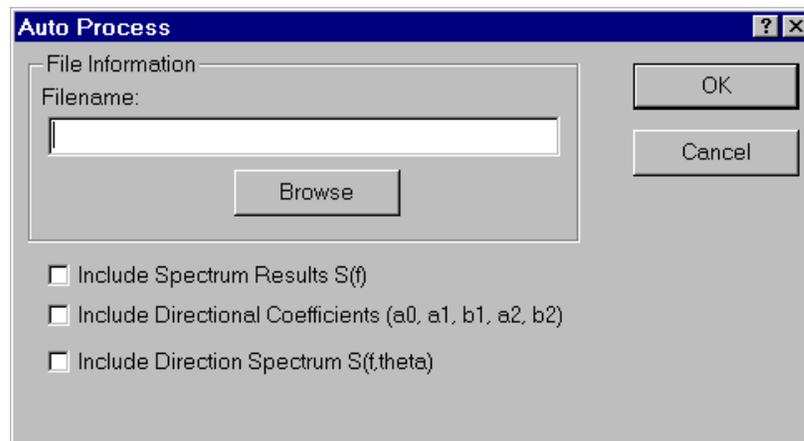The Auto Process dialog box shown in Figure 6-1 opens.

Figure 6-1: *The Auto Process Dialog Box*

4▸ In the Auto Process dialog box, select the Include Spectrum Results S(f) check box if you want to include the Wave Spectrum Results with the Wave Average Results when saving the wave information.

5▸ Select the Include Directional Coefficients (a0, a1, b1, a2, b2) check box if you want to include the Wave Directional Coefficients with the Wave Average Results when saving the wave information.

6▸ Select the Include Direction Spectrum S(f, theta) check box if you want to include the Wave Direction Spectrum with the Wave Average Results when saving the wave information.

7 ▶ In the File Information area, do one of the following:

• In the File name text box, enter a path and filename, including a filename extension, of the file in which to save wave information.

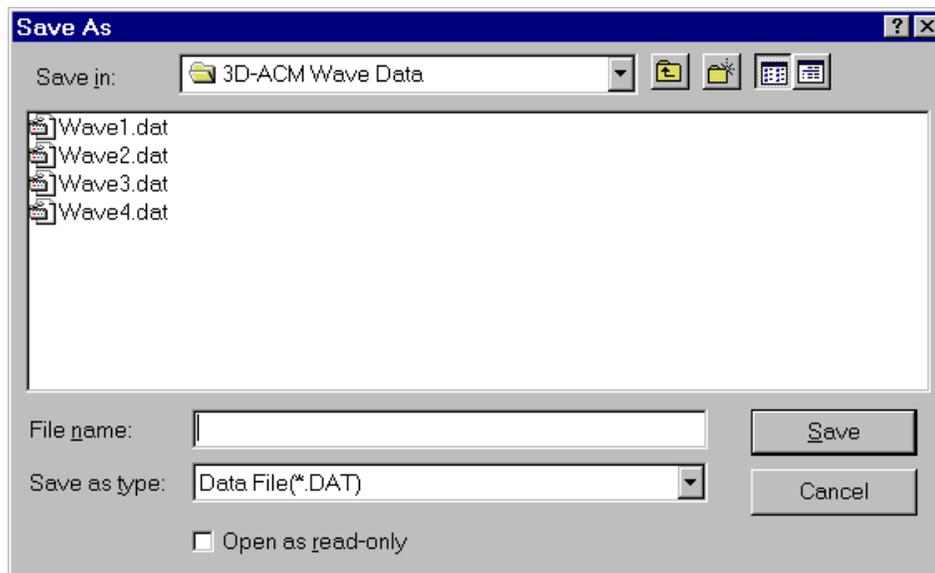• Click Browse. The Save As dialog box for DAT data files shown in Figure 6-2 opens.

Figure 6-2: *The Save As Dialog Box for DAT Data Files*

8 ▶ If you entered a path and filename in Step 7, click OK. The wave information is saved to the specified file, and the Auto Process dialog box closes.

If you clicked Browse to open the Save As dialog box, continue with Step 9.

9 ▶ Click the arrow in the Save in drop-down list box and select the folder in which to save the wave information data file.

10 ▶ Select the file in which to save the wave information, or enter the name of the file in the File name text box. The extension *.dat* is added automatically.

11 ▶ Click Save to close the Save As dialog box.

12 ▶ Click OK in the Auto Process dialog box.

The wave information is saved to the specified file and the Auto Process dialog box closes.

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Exporting the Data

WavePost allows you to export all the parameter data in a data file plus current speed and direction, where WavePost calculates current speed and direction from the current velocities. You can also choose to export *only* current speed and direction.

To export the parameter data plus the current speed and direction, or just the current speed and direction:

1 ▶ Open one or more data files.

WavePost reads the data files and the Velocity Time Series graphics display for each data file opens.

2 ▶ If more than one data file is open, click the title bar of the graphics display window corresponding to the data file to be exported.

The graphics display window is made active. If only one data file is open, the graphics display window for that data file will already be the active window.

3 ▶ Choose Process ➤ Export Data

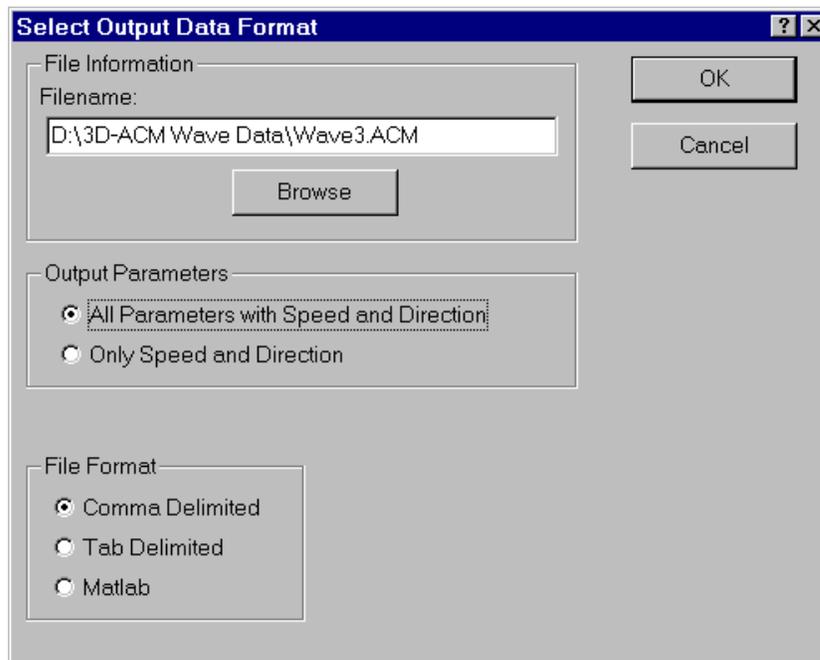The Select Output Data Format dialog box shown in Figure 6-3 opens.

Figure 6-3: *The Select Output Data Format Dialog Box*

4 In the Output Parameters area of the Select Output Data Format dialog box, select one of the following options:

- All Parameters with Speed and Direction to export all the parameter data in the data file plus the calculated current speed and direction.

- Only Speed and Direction to export only the calculated current speed and direction.

5 In the File Format area, select one of the following options:

- Comma Delimited to use a comma delimited format.

- Tab Delimited to use a tab delimited format.

- Matlab to use a Matlab format.

6 In the File Information area, do one of the following:

- Verify that the path and filename WavePost automatically enters in the Filename text box is satisfactory.

- In the Filename text box, enter a different path and filename, including a filename extension, of the file to which to export the data.

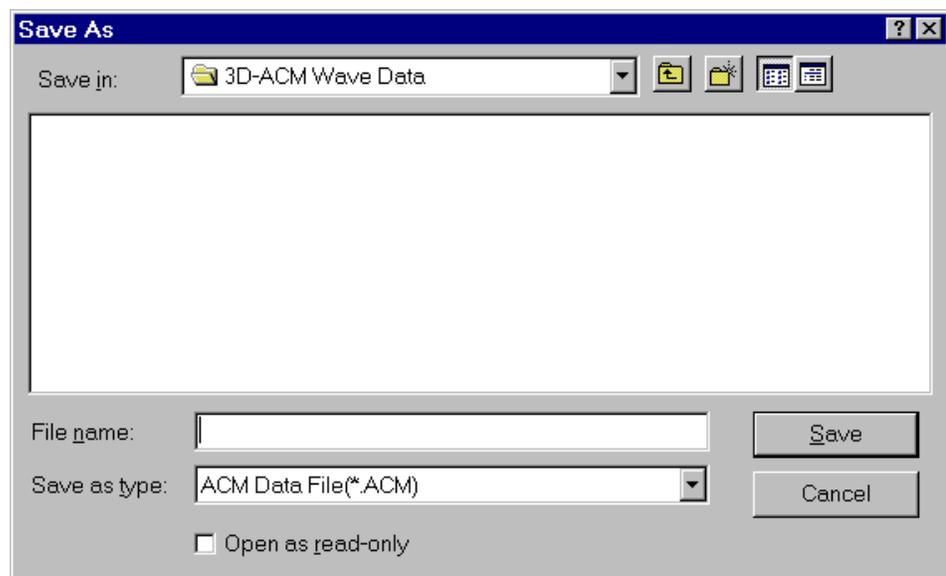- Click Browse. The Save As dialog box for ACM data files shown in Figure 6-4 opens.

Figure 6-4: *The Save As Dialog Box for ACM Data Files*

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7▸ If you verified that the filename in the Filename text box is satisfactory or entered a new filename in Step 6, click OK. The data are exported to the specified file, and the Select Output Data Format dialog box closes.

If you clicked Browse to open the Save As dialog box, continue with Step 8.

8▸ Click the arrow in the Save in drop-down list box and select the folder in which to save the exported parameter data file.

9▸ Select the file to which to export the data, or enter the name of the file in the File name text box. The extension *.acm* is added automatically.

10▸ Click Save to close the Save As dialog box.

11▸ Click OK in the Select Output Data Format dialog box.

The data are exported to the specified file, and the Select Output Data Format dialog box closes.